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[OFFICIAL NOTICE.]

### Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

[NOTICE.]

### Twelfth Annual Meeting, Pacific Coast Gas Association.

SAN FRANCISCO, CAL., June 6th, 1904.

To the Members of the Pacific Coast Gas Association: The Twelfth Annual Meeting of the Pacific Coast Gas Association will be held in the city of San Francisco, Tuesday and Wednesday, July 18th and 19th, 1904, and will be called to order at 10 A.M., Tuesday, by Mr. W. A. Aldrich, President. Place of meeting, Assembly Hall, Mechanics' Library, Post street, between Montgomery and Kearny.

The meeting of the Directors will be held Monday, July 17th, 1904, at 8 P.M., at the office of the Secretary, 427 Rialto Building, corner New Montgomery and Mission streets.


LIBRARY OF CONGRESS JUL 25 1904 SMITHSONIAN DEPOSIT.


The following papers will be read:

President's Address, by Mr. W. A. Aldrich.

"Benefits of Consolidation," by Mr. John Martin.

"Some Practical Observations on the Flow of Gases in Pipes," by Mr. L. P. Lowe.

"Auld Lang Syne," by Mr. T. R. Parker.

"Notes Regarding California Petroleum," by Mr. P. W. Prutzman.

"Pressure Points," by Mr. E. C. Jones.

"From a Consumer's Standpoint," by Mr. John A. Britton.

"Effective Steam Plants for Gas Manufacture," by Mr. C. H. Pennoyer.

"American vs. English Gas Cooking Stoves," by Messrs. A. S. Main, Glasgow, Scotland; C. S. Barbour, London, England; H. Trenkamp, Cleveland, O.

"Wrinkles," edited by Mr. R. P. Valentine.

"Experiences," edited by Mr. Geo. S. Colquhoun.

"Novelty Department," edited by Mr. Geo. H. Hollidge.

"Question Box."

The annual banquet will be held Wednesday, July 19th, at 7 P.M.

The annual outing, for members, their families and friends, to Alum Rock, Santa Clara county, is set for Thursday, July 20th, particulars of which will be announced at meeting.

Arrangements have been made for a lecture on "Radium," to be given Tuesday evening, July 18th, by Prof. Edward Booth, of the University of California, to which members and their families will be admitted.

JOHN A. BRITTON, Secretary.

[OFFICIAL NOTICE.]

### Board of Revision of the Ohio Gas Light Association.—Preliminary Notice.

This department is now preparing to take up the revision of the Question Box for 1903 and 1904. As a preliminary, all contributors to either issue are invited to forward to the undersigned, at their earliest convenience, any comments, changes or additional notes bearing on their original contributions.

To the readers of the JOURNAL, who have not followed the work of the Ohio Gas Light Association closely, the following explanation is offered: Two years ago a circular letter was sent out to everyone in the country known to be interested in gas, inviting all gas men to suggest questions on subjects relating to the industry on which they wanted information or which they thought it would be profitable to bring up before the Association. A large and diverse list of questions was obtained, representing many points of view, according as the authors were officials or employees in various departments of gas enterprise and widely distributed geographically.

After these questions were collected and classified the completed lists were sent out, requesting from each individual correspondent answers to as many questions as he felt able to handle. The answers received were many and various, representing a mine of valuable matter, and, where subjects were open to difference of opinion, especially valuable, because of the different viewpoints represented and the fertile field of

suggestions discovered. The printed volume of questions and answers dealt with 175 different topics and covered 142 pages. This was repeated for the next convention, and the second issue, composed of questions and answers, received in 1904, contained 316 questions and covered 296 pages, or, including editorial comment and indexes, 341 pages. It is the purpose of the Association to continue this work, gathering each year if possible, an increasingly larger harvest of material to add to the store previously secured.

At the Cleveland convention it was proposed to take up the revision of the matter thus brought into the archives of the Association, as outlined in the following paragraphs condensed from the 1904 "Proceedings."

If this [the annual issue of the Question Box] is to be continued, the fund of information which will eventually be collected in classified form is simply incalculable. The Question Box as it stands represents one of the most important developments in gas literature in recent years; and if we can remove the element of unreliability, and that without affecting the present policy of its publication, we can produce in a very short time an encyclopedic work that will surpass any single venture ever attempted for the advancement of the industry.

"The plan I have to propose is to give our attention to the accumulated fund of information, growing in bulk and diversity with each yearly increment [the past editions, which have become a part of the records of the Association], and protect the man who turns to this collection for positive information or advice. That is to say, after each yearly harvest of contributions has been published as received, the material so acquired must be revised, digested and merged into a compendium that will represent everything worth keeping received up to that time; supplementing wherever possible with data and further references, corresponding with the various contributors to the Question Box, asklng them to co-operate in the revision of their answers. The contributor probably wrote his answer under stress of other work; he has learned more about his topic since then; he has given it more thought and perhaps has experimented further; he may be able to give figures which will bear out and render more valuable what was in the first instance a bold statement. The report will grow year by year, and ultimately it may even be found desirable to incorporate conclusions from papers read before the Association.

"Mr. President, I move that the Ohio Gas Light Association constitute a Board or Committee of Revision with powers and duties as here described, consisting of a chairman and from 9 to 19 associates, who will be chosen with a view to representing so nearly as possible the best technical material within the compass of our membership. The chairman, appointed at this meeting, shall select, in conjunction with the general officers, associates from engineers and other active workers in the profession who are known to be experts or authorities on construction, plant operation, distribution, chemical and physical research, manufacture of coal gas, of water gas, of tar, ammonia and other residuals, new business, managerial direction and accounting and record, and such selection shall constitute an appointment by the Association. During the ensuing year it will be their duty to digest, edit and annotate the contents of the Question Box for 1903 and 1904; revising the material as may seem necessary, stamping such matter as rests upon unquestioned scientific fact or unimpeachable experimental data with the seal of authority, and, on the other hand, where difference of opinion is widespread, calling attention to these differences, and reconciling, emphasizing, or pointing out the necessity for further inquiry, as each case may demand,"

This proposal met with the most hearty approval of the delegates present at the convention, and it is the hope of those having the revision immediately in hand that each member of the Association and everyone interested in gas will lend at least a little assistance in making the revision accurate and thorough. It is expected to credit each contributor with everything of merit he sends in, or has sent in, and the whole gas fraternity will benefit by the work.

The undertaking is going to attain a size and importance which will fittingly reward the expenditure of energy that has pushed it so far, and an early start must be made. All the original contributors are urged to aid in correcting and amplifying their own matter; and snggestions and data from everyone interested in gas (whether he has previously interested himself in the Question Box or not) will be gladly received.

A number of sub-committees will be organized, and the material will be classified into groups and assigned to the appropriate committees for review. All communications intended for any of these several committees of revision, or for the general work, should be sent to

H. B. Harrop, Chairman,
131 Twenty-fifth street, Milwaukee, Wis.

## BRIEFLY TOLD.

Death of Captain William Henry White.—In deepest sorrow we have to chronicle the death of Captain William Henry White, whose answer to the final summons was made, at an early hour of the morning of Sunday, July 3d, in his apartments in the Hotel Marie Antoinette, this city. In the first shock from the blow that death so unerringly and pitilessly aimed, it is hard to put composedly on paper the sad facts that tell the ending of his life's story, but in their cold, bare entirety they appear like this: He returned from the joint meeting of the Western Gas Association and the Congress of American Gas Associations late the afternoon of June 18th. On the journey home he contracted a cold that seemed not particularly severe, but some time after his arrival it developed quite seriously. In spite of the quickest and best attention that could be given, the malady developed distressing symptoms, and the wretched sequence to it was paralysis that, stroke upon stroke, finally terminated his earthly life. It requires no word from us here to proclaim his standing amongst men, and especially so in his relations to the gas industry of this country, which his efforts did so much to advance, and that in return put upon him the greatest advancements and recognition that it could bestow. The son of a gas man (the late Col. Ambrose J. White, well known to the metropolitan fraternity of 30 years ago), in him the teaching and practice of his well respected father were fittingly illustrated. And it is our province to say that no other man in the gas industry, particularly in the last 20 years, was better liked than Captain William Henry White. However, this short mention is not intended as a history of his career—many a day will be required to collate that properly—so the present story will have to do with the details of that which followed his death. In due time the remains were removed to the home of his sister, Mrs. W. A. Dennison, 20 Montgomery Place, Brooklyn, N. Y., and there the funeral services were held, the afternoon of last Wednesday, in the presence of as representative a body of gas men as ever gathered together to pay the final tribute to one of their fellows. Not that scores of others were also sharers in the sad rites, for about every walk in life was represented—clerical, masonic, military, political, club and plebeian, if some (and they were few) of his workmen in the old Citizens Gas Light Company, of Brooklyn, can be so called—few they were, because that time was very many years ago. The Episcopal service was solemnly presented by the Rev. Joseph P. Smyth, and the thrilling musical rendering was made by the Apollo quartette and by Mr. William Carleton as soloist, with Mr. Oscar B. Weber as accompanist. The floral tokens, which were beautiful and many, included pieces from the Society of Gas Lighting, of which body the Captain was Secretary, the New England Association of Gas Engineers, the Western Gas Association and the American Gas Light Association. The heartful collection further numbered at least 20 pieces from gas men, some resident more than 1,500 miles away. The ceremonies in the household were later on followed by impressive work at the grave in beautiful Greenwood Cemetery by his masonic and military associates, perhaps the most impressive of those being the simple and solemn work of the Loyal Legion, of which well-tried body he had for many years been a consistent and devoted member. The pallbearers were: Frank R. Lawrence, William H. Bradley, Chester S. Lord, Charles W. Price, J. Newton Green, Oscar B. Weber, Richard H. Gaines, Wm. Jay Ives and John Elderkin, all members of the Lotos Club, of this city, of which body the Captain was for years Vice-President. The Captain was in his 61st year, having been born in Philadelphia, March 4th, 1844, and no one who knew him well can say aught to the contrary of this that in him was centered every quality that causes real men to like and respect each other. So much for the present.

Notes——

Mr. George G. Earl, General Superintendent of the New Orleans Sewerage and Water Board, advertises that sealed proposals will be received at the office of the Board, No. 602 Carondelet street, until noon of the 15th prox., for the furnishing and erecting of two complete gas producer plants for supplying gas to gas engines. Plans and specifications can be inspected in the office of the Board, Room 20, New Orleans City Hall.

Mr. Alexander J. Campbell, who retired from the management of the plant of the Norwich (Conn.) Gas and Electric Company the 1st inst.—the plants are now under the control of and are being operated by the municipal authorities—on the eve of his leaving was presented by his former employees with a handsome ring, emblematic of his Masonic connections.

The Cincinnati Gas and Electric Company will issue $1,740,000 of treasury stock. It can be taken by holders of record, June 15th, at par.

OFFICIAL REPORT.—REVISED BY THE SECRETARY.—CONTINUED FROM PAGE 7.]

## TWENTY-SEVENTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD IN THE HALL OF CONGRESS, ADMINISTRATION BUILDING, LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO., JUNE 14TH, 1904.

MORNING SESSION.

*Discussion on the Paper by Captain W. H. White, on "Some Thoughts on Candle Power."*

[For the text of the Paper, see JOURNAL, *ante*, p. 6.]

The President—Gentlemen, you have heard a calm review of the underlying principles of a question which is certainly a growing one. I hope those who desire to participate in the discussion will feel free to do so, and do it fully. Bring out the facts, whether we are going to make 12 or 14-candle gas in the future, of heating value sufficient for cooking purposes and for incandescent burners for lighting, or whether we are going to expect the continuance of 18, 20, 22 or 26-candle powers as at present. Discussion is in order.

Mr. Forstall—I think that Captain White's rather passionate arraignment of the poor gas engineers who made the choice between low candle power coal gas and higher candle power enriched gas in favor of the latter, is not justified to say the least. Fortunately for gas companies, people who wish light have always wanted to get it the cheapest way they could. When the question of richer gas than could be produced by ordinary coal gas methods was brought before the gas men of this country, it was almost absolutely necessary for them to make a higher candle power gas in order to retain their business. Gas could only be burned economically in flat flame burners. There was no other burner that could be given to the consumer that he would use. None would use the Argand all over their houses although it might be used in special places. The electric light had just been brought into use, and its promoters were boasting that they were going to drive the gas companies out of business inside of 3 or 4 years. The way in which that competition could be most successfully met was by higher candle power gas, which could be made, candle power for candle power, more cheaply than the comparatively low candle power coal gas. It was no mistake of judgment for the gas engineers of that day to take the action which they did under the conditions that then existed. The conditions that existed then exist no longer, but they did exist as late as 1892. My connection with the gas business does not go back quite as far as Capt. White's, but I remember testing one of the first Welsbach burners that was made in this country, and it was not worth 2 cents. We were making at that time 20-candle mixed coal and water gas, and we could not get from that incandescent burner more than about 5½ candles per foot, while we could get in our ordinary flat flame burner 4 candles per foot. The conditions may now be such that enrichment does not pay. When enrichment was adopted in this country they were such that it was absolutely necessary it should be adopted. Another thing I noticed in Capt. White's paper was that he charged the gas company (I presume the gas company of to-day) with allowing its customers to use flat flame burners that only gave from 10 to 12-candle power per cubic foot I presume, from gas that on the photometer showed 20 to 22-candle power. I think such companies have all gone into bankruptcy. There is no up-to-date gas company that does not see that its consumers get a burner that will give 20 or 22-candle power from 20 to 22-candle power gas. It is just as easy for the consumer to get the candle power as it is to get it on the photometer. Not being a candidate for a Presidential nomination, I think I am perfectly safe in saying that the candle power of gas is usually local; that it is a question that has to be decided entirely by local conditions. We are not selling gas for light only, in fact we are not selling gas at all; but, as Mr. Glasgow said in his paper before the American Gas Light Association last October, we are selling what gas will give, we are selling energy. You can take it in the way of light, you can take it in the way of heat. What the gas company has to do as to working out what will be the greatest success is what kind of gas, what quality of gas it can use and furnish the greatest amount of energy at the least price. A 50 cent gas, as you, Mr. President have shown in one of your papers, with only 300 heat units, is not worth as much as dollar gas with 600 heat units. Each company has to settle for itself the question of what kind of gas it is going to make in order to give the consumer the most for his money. It may be coal gas in one place, it may be carburetted water gas of 22 or over 24-candle power in another place. There is no fixing a law that can be laid down.

The President—We have with us as one of our visitors one of our honorary members, a gentleman whom it is always a pleasure to see and who has come many a mile to meet with us this year. His position in connection with gas and electric matters in his own State is such that I think he is peculiarly able to give us some opinion worth while as to the proposed coming gas that we shall distribute, and I think we would all be very glad to hear and welcome a few remarks from Mr. Forrest E. Barker, Chairman of the Board of Gas and Electric Light Commissioners of Massachusetts.

Mr. F. E. Barker—I doubt if I ought to interrupt the even tenor of this meeting by any attempt to discuss this topic. I am naturally very much impressed with it. The companies in our State have not been especially ambitious to obtain the very high candle powers to which reference has been made. The legal standard was formerly 15, but for some years has been 16 candles. There has been no move for several years to raise this figure. An average of 22 candles would be very exceptional in our State. I have some doubt, taking the country through, whether the gas generally would reach the Massachusetts standard, although it may be true that the quality supplied gives as general satisfaction in the communities where it is used as it does in our State. The suggestions in the paper are very interesting, but I think there is also a great deal of force in the suggestion of Mr. Forstall that it may be very largely a local issue. There is pretty certain to be a general conviction in the public mind that if gas is of 20-candle power the consumers are getting more for their money than if it is 16-candle power. It may be true, as Capt. White suggests, that many of them are not getting more, owing to the unfortunate conditions under which gas is so frequently burned. One can hardly consider this question without being impressed with the importance of increased efforts by the companies to assist their customers, as far as practicable, toward securing the very best results from the gas they use. I think there is a growing tendency in the best management to-day to do more work of this character in order that their customers may get more value out of the gas. With increased attention it may be that, even with lower candle power gas than is now commonly supplied, customers may be able to realize more for their money.

Mr. A. S. Miller—There is no suggestion in the paper that the heating power of gas might vary with the lighting power. Taking gas of 20 to 22 candles, a reduction of 1 candle reduces ordinarily the heating power about 3 per cent. If we are selling the gas at so much per unit, would not it be cheaper to keep those units in than to drop them out and make a corresponding reduction in the selling price? How many of our people could afford to reduce the selling price 9 per cent. in order to reduce the illuminating power of the gas by 3 candles. I think we could afford to raise the illuminating power 3 candles in order to increase our selling price 9 per cent. and give the consumer exactly the same amount for the money.

Mr. I. C. Copley—The idea has occurred to me for some years past, in discussing this question of candle power and heat units, that every man who sells any article, who is in business permanently as we necessarily must be, must consult the needs of his customers, and to that extent, as Mr. Forstall has already suggested, it is a local question, to sell what is best for the customer in each locality, and that the gas man who does not know what is best for his customers certainly has not sufficient grasp of his business. It would seem now that the question must resolve itself into a fair profit for the company, and selling the consumer that which can be made to give him the best service.

The President—It would seem to the Chair that the point of the Captain's paper is this, if I understand it rightly: A superintendent is assumed as competent in the management and is assumed as competent to know what the public requires, and we pretty much agree what the public wants is heat; usually that is the preponderance. We are selling gas nowadays for use for heating purposes—50, 60, 70, sometimes 80 per cent. of our total output. I do not think it is looked upon that practically a reduction of price is necessary because of a question of reduction in the lighting value, but the practical question is this: If legislation, ordinances and stipulations permit it, could not we save some of the cost of manufacture and give the public the benefit of that in some other direction with the aid of gas that would be less smoky where it is used in flat flame burners, less liable in many respects to stoppages, having a less amount of carbon which deposits in various shapes. Could not we substitute 14-candle gas and do just as well practically with but few flat flame burners, and putting out for fuel 60 or 80 per cent., as we are doing to-day in putting out an 18 or 20-candle power gas, if ordinance stipulatious permit it? I understand that on the other side the commercial business is done on a much lower scale of candle power than is in vogue here; 15, 14, 13-candle powers in a

great many places and in several countries. I expect those people want light just as we do, they want heat just as we want it, yet they are doing business year in and year out just as we are doing and propose to do. They have not been educated up to the 20, 25 and 30-candle power standpoint was as the case in this country as the result of a great quantity of cheap petroleum for many years in the past. We have been educated up by the ease of making rich candle power gas to high candle pwers and legislation has nailed us to that position, and now when we find, as I understand it, that our commercial requirements would be satisfied by a good flame of clean, medium candle power and high heating value of gas (which 12 to 14-candle power gas would give), we find legal difficulty in taking up that commercial product on account of the ordinances that have been put into eflect in many places in the last 20 or 30 years, caused by cheap petroleum in my opinion. If the people on the other side of the earth can do business among millions of population with 12, 14 and 15-candle power gas, and do more business than we are doing here, I do not see why it is not our destiny to gradually work to the same condition?

Mr. Patton—I have had to do with this matter from a power standpoint. My experience is we get a higher power efficiency with a low heat unit We obtain as low as 9,500 heat units to a horse power. With acetylene gas the best result I obtained was 16,000 units, and you all know the candle power claimed for that gas.

Mr. R. M. Searle—This begins at the point where you have to educate the public. We are all speaking of a gas of certain heat units, and give it the term candle power. That is wrong to start with. You go after a franchise; the first thing a lawyer asks is, "What is your candle power?" You answer, "We have 500 heat units." He sends to Chicago and gets a copy of a franchise that calls for 22-candle power. He again asks, "What is your candle power?" "We have 500 heat units." "I don't care; what is your candle power?" "It is 11-candle power." "Then Chicago is making twice as good gas as you do." You have to drop the term candle power and get some new term to educate the city fathers along the line of B.T.U's.

Mr. W. E. Steinwedell—Regarding the electrical end of the business most of us operate electric light plants in conjunction with our gas business, and a parallel may be drawn from the arc lamp. In contracting for city lighting, arc lamps are generally specified, as the so-called nominal 2,000-candle power lamp or something to that effect, but the lamp only produces candle power according to the energy put into it. We all know that 2,000-candle power is only produced for a very small angle, and that it is not the average candle power by any means. The candle power of gas may be likened to the voltage of an electric current, and the number of heat units in gas may be likened to the amperes in electricity; both should be stated to give an intelligent idea of the gas or electric current.

Mr. Forstall—Your remarks emphasize my position that in the question of candle power the question of quantity comes to be met as a local condition. In the countries of which you speak, which are sending out 12 to 14-candle power gas. they are doing it because they cannot make higher candle power gas cheaply. In this country we can, and there is no reason in the world why it may not pay us to make high candle power gas, even though it does not pay Germany or England to do it. Now, as to the question of being tied up by ordinances, the first problem that has to be solved is whether it is worth while to take the trouble to educate the public down to a lower candle power. If there is no object in low candle power, what is the sense of educating your public to it? You have got to settle whether low candle power is cheaper for what you ought to give the public than high candle power before it is worth while to discuss the question whether the public ought to be educated to low candle power. In a great many sections of this country low candle power is no cheaper for what you want to sell the public. In some sections of the country it is cheaper. It is entirely a question of how you can give the consumer what he wants at the least possible price. As to reducing the quality of the gas as to heat units or candle power, and giving the consumer the benefit some other way than price, I don't think that will work. Even in the incandescent burner, in spite of what some or our English friends say, the preponderance of evidence seems to be that the higher the calorific power of the gas the more light you get, if you take the trouble to adjust the burner to the gas, and any man who is not able to do that ought not to be in the gas business.

The President—Captain White will now reply to the comments made on his paper.

Captain White—As to friend Forstall's reference to the elegance in which I always clothe my remarks, they seem not as attractive to him as usual upon this occasion, for he overlooked a whole paragraph in which I suggested or explained that this was absolutely a local question which each man would have to settle for himself. I could only lay down general propositions with the hope that you would take them home like a dog takes his bone back to his kennel to gnaw at it at his leisure. Now Mr. Forstall makes another mistake on this subject of high candle power. I have done the same thing myself, in that I have given advice and counsel which were wrong, but I did it conscientiously. I do not believe it is necessary to cram down the throats of our consumers a 25-candle gas when a 16-candle gas will do everything they want and which costs a lot less money. I am very glad to hear our dear friend Mr. Miller. He comes here in 1904, gives you the old story that I commenced to give you back in 1876, when I proposed some of the earlier changes in apparatus now common in this country. It is really amusing to have a man always begin at the wrong end to see whether he can put in a new purchase which will save 50 per cent. in the cost of manufacture. That is usually the argument of the directorate when you first undertake to convince them that a change of apparatus would enable them to pay added dividends, make some decrease probably in the cost of gas to the consumer, and which certainly would enable them to make better gas. Some of you have been received with the reply "O pshaw! What is the use. We are making money now." If you say anything about public dissatisfaction then "If they tear the gas works down, let them go." That is about the way it is. Mr. Copley has about the right idea when he says it is simply a question of finding out what your community want and then giving it to them. It is with some satisfaction I notice that some of you come to think as I do. It shows after all we have been thinking along right lines. Several things I have said with which apparently you have not had much sympathy, and then after a while I find two or three other fellows thinking the same thing that I did. I take a personal satisfaction in that. Now this did not pretend to be a scientific paper. As I said in starting out, it is one of those common, everyday talks which Captain White sometimes gives you and whether you like them or not you never throw mud at me. I appreciate it.

The President—It is very fitting that Captain White should receive the usual vote of thanks. And I will take it as the sense of the meeting that we instruct the Secretary to have the record duly show that it is always a pleasure to hear from him. No matter which side he takes, the Captain can take either with equal ability, or both sides with equal alacrity.

### Introducing Two Engineers from Foreign Lands.

The President—This meeting has been out of the ordinary in having numbers of friends come from long distances. We have under our roof to-day not only our friends and members from Boston Bay and the good old down-east country, even beyond that, but also from the Pacific coast. We also have a friend from an even greater distance than that. Mr. A. Naito, Engineer of the Tokyo (Japan) Gas Company, to whom I want to introduce you.

Mr. Naito—I thank you, gentlemen. It affords me great pleasure to meet with the gas engineers of this country.

The President—It is a great pleasure to have Mr. Naito with us. We hope he will be with us as much as his time will permit and have a good time while he is with us. We also have with us—whether present in the hall or not I do not know, but attending this convention—Mr. Thos. Redman, an Engineer from Bradford, England, who became sufficiently interested in the Western's meet to not only make a long trip to be with us, but also to send several gas machinery models that are on exhibit at Section 33, A. Mr. Redman I think is around, and I hope when you meet him you will extend to him the glad hand of fellowship. We are glad to have him here.

On motion of Mr. Somerville, the Convention adjourned to reassemble at 2 o'clock P.M.

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### Afternoon Session.

The President called the meeting to order at 2:30 P.M. The first business in order was the

### Report of the Committee on Library,

which the Secretary read as follows:

St. Louis, Mo., June, 1904.

To the Members of the Western Gas Association: The Library Committee would report herewith as to the matter of Association Library during the year.

Probably the predominating thought is regret at there not being a greater use of the Library during the year, or a greater increase in its volumes, by the securing or donating of books by members. Although consisting of about 250 volumes, directly pertaining to our business (and a list of which is printed with the membership list sent every

member) there have been but about 20 volumes loaned during the year to about 16 members. And the new books contributed have been nil, excepting for "Proceedings" received from other Associations, and a volume of *Progressive Age* donated by the Secretary. This betokens either a lack of interest in the Library and that our Association is not ripe for it, which we are reluctant to credit, or else some fault in the running of it. If any member has any thoughts or criticisms on these points it is sincerely hoped that he will express them now as the Secretary and the Library Committee will welcome any sincere criticisms or suggestions that will improve things or increase the Library's usefulness. It is likely that it is overlooked in greater things and that greater publicity is what is needed, and we suggest the advisability of the Secretary being directed to send every three months, for the next year, a circular, reminding of it, asking for books, inclosing the list of books, and see whether this will improve its position.

The Special Committee on Card Index to Gas Literature, authorized by the Association two years ago, would report that the first section of the Indexes was completed about a year ago, and a good number distributed to subscribing members; a sample is on the desk herewith, and examination of it (by those unfamiliar with it) will show what a convenient key it is to the most important current or recent articles on practically all gas subjects. A number who have used it have commended it in very high terms, and ordered more copies.

The Chairman of this Committee constantly uses it in his own gas works, month in and month out, to locate desired information. There are still some copies on hand for further subscribers and new members.

The preparation of the cards was done by the Chairman of the Committee, and it has been expected that reference cards for the year 1903 would be prepared and ready for distribution and addition to the index sets at this meeting, but the unusual work of the gas exhibit has quite precluded the index. It is hoped, however, to cover this at an early date.

Respectfully,
F. H. Shelton,
Wm. McDonald,
T. D. Miller,
Jas. W. Dunbar,
} Committee.

The President—Gentlemen, you have heard the report of the Library Committee. The chief point seems to be to make the Library more appreciated and more useful. Are there to be any suggestions or criticisms on the subject?

The Secretary—In the absence of any suggestions, I move that the report of the Committee be received and the recommendations concurred in. The principal recommendation is that a bulletin be issued every 3 months giving a list of the books contained in the Library and the use that the members can make of it, and also calling for new contributions from those members who have the success of the Library at heart. (Adopted.)

The Secretary then read the following

### Report of Committee on Publication of Proceedings.

St. Louis, Mo., June 14, 1904.

To the Members, Western Gas Association—Gentlemen: Your Committee on Publication of Proceedings begs to report that the Fourth Volume of the Proceedings of this Association has been published during the past year, embracing the meetings from 1899 to 1902, inclusive.

The Proceedings of this Association are now published in book form, from the years 1887 to 1892, inclusive. It is hoped that the Committee will be able to publish the Proceedings of the Association previous to the year 1887 in one volume, which will be the next one prepared.

O. O. Thwing,
Wm. McDonald,
} Committee.

On motion the report was received and adopted.

### Obituary Reports.

The President—Gentlemen, our next business is a melancholy duty and that to which we must particularly this year give heed. During the past year we have had several deaths, two of which were men distinctly out of the ordinary: Gen. Andrew Hickenlooper, of Cincinnati, passed away recently, as did Mr. Henry B. Leach, of Taunton, Mass., an honorary member of the Association. I think it is fitting that something more than ordinary in the way of mention should be given, and I will ask Mr. Paul Doty, the Chairman of the Committee on Memorials, to pursue that matter on lines that have been discussed.

Mr. Doty—The Western Gas Association in formal assembly is again called upon to record its appreciation of those absent members who have answered the greater roll call, and to express their sincere sorrow at the loss in membership and to give their sympathy to the stricken familties. As our President said, death has laid a heavy hand upon the membership list this year. The men who have passed away have been more than usually prominent in the roll of the Western. The list includes Asa S. Bushnell, ex-Governor of Ohio; Henry B. Leach, of Taunton, Mass.; Thomas Littlehales, of Syracuse, N. Y.; and General Andrew Hickenlooper, of Cincinnati, O. It seemed fitting to your President, in view of the distinguished services of the gentlemen, not only to the gas industry but to their respective States, that something more than a mere mention of their names should be incorporated in the proceeding, and your President, therefore, has assigned to various intimate friends of these gentlemen the preparation of a memorial tribute, and as Chairman of your Committee I can do no more at the present moment than to invite your respectful attention to these memorial addresses. To Capt. William Henry White has been assigned the preparation of a memorial to Gen. Andrew Hickenlooper.

Captain White—I do not entirely agree with the view of the President, stated in his address this morning, that the time of these meetings, which is always limited, should be taken up in memorial addresses, but in all periods of our lives there are moments when it seems as if it were our wish to put our hands upon the wheel of time to stop it for a moment, that we might call to memory scenes in the life of a dead friend, and that we might consider the value of that life as spent in active service and fraternal association. I thus feel more keenly as my own years pass on, for I have seen so many men with whom I started in business life pass to the silent tomb, only to know that all that might have been said or done by their associates at the time of their death was not done. Mere funeral ceremonies, the mere passing of a kindly word as his associates meet together at their next regular gathering, do not seem enough. A man who has spent long years of manly, earnest and honest life in our midst, responding to the touch of the hand of death upon his shoulder, has passed away from the living to join the innumerable army of the dead. That we merely bow in acquiescence to this summons does not seem enough. General Hickenlooper was a peculiar instance of the made-to-order gas man. Trained as a civil engineer, he knew nothing whatever about the manufacture of gas until his association with the Gas Company, as the Engineer of the City of Cincinnati, gave him, with his keen insight into everything of an engineering character, a somewhat passing knowledge of our business. But his great abilities as an engineer had been made known to his fellow citizens, and when the Gas Company, feeling that in the ageing of their President, and the increasing demands upon the manufacture, called for a skilled and trained management, and reached out in search of some man to fill the place of the good, old-time gas superintendent, they naturally turned to a man of the education and rare abilities of General Hickenlooper. The General had been among the first to answer to the call of his country for volunteers to defend her from the attacks of the enemy. Without any previous training in that line (he had never heard a gun fire in his life, even in salates, for there were not many salates along the Ohio river at that time), the General raised a battery, that was soon to give him standing among the officers of the army that even any man trained in the school at West Point might feel proud. He became Artillery Chief of the Army of the Tennessee, which gave him practically command of a large part of the artillery in that famous army. Returning to civil life he brought with him generally, as did the home coming soldiers of those days, a record that was glorious. Selected to fill several offices, it is my pride, as his personal friend and his fellow gas man, to say that the city of Cincinnati selected no position in which to place General Hickenlooper that was not equal to his grasp of the situation, and left the office, with credit to himself, in a more improved condition for his having filled it. The step was a natural one from one class of engineering to another, and I can say without fear of question from any of you that no other gas man west of the Allegheny mountains did so much for the improvement of the profession, so much for its working out as a scientific calling. His works were always in order, and his practice was regularly a step in advance of any other man's work, and the result was, when the General, through the overwork of these long, active years, when paying the penalty of his nervous temperament, was stricken down so that he could not longer keep a controlling hand upon the operations of his Company, he had trained young men about him to take hold, and he left to them a plant which was equal to any plant in the United States, so the Cincinnati Gas Light and Coke Company actually suffered nothing by the removal from the office to the sick chamber of this distinguished man. It is a pleasure to know that during all those years, many of them very strenuous ones, when the General controlled the city, that was a wealthy one, that the Company met and defeated probably more opp sition propositions in Cincinnati than usually fall to the lot of any one city. Fights

were often bitter, but everyone indicated the complete and analytical manner in which the General approached every question brought to his attention. When the parties presenting the other side appeared, they found that all they had to offer had been carefully searched over by the General, and that his defense for his Company was so complete that not even tne money of the opposition Company could purchase an entrance into his city, until Cincinnati finally reached the conclusion that its lighting supply was far betier controlled through the hands of a man of this caliber than it might possibly be by any new service that was offered. I say through all that strenuous life, through all the activities of such a mind, the General enjoyed in professional life the love and respect of that community. He had more warm personal friends in Cincinnati than often fall to the lot of any active man of business. You may go to the Board of Trade, the Stock Exchange, along the streets with the merchants, everywhere you will find men who have only good words to say of General Hickenlooper. It seems to me that this sort of record is the very best of memorials that a man can leave, that the people remember you, not so much for the great things you did, not so much for the controlling ability with which you handled the industries that might have been entrusted to your hands, but that they reached down deeper into your being and recognized the true manly character, the kindly, genial elements that go to make up the value of manhood. I venture to say that of all the great men who have adorned our profession during my lifetime, and have left kindly regret among its members, none has passed out from the profession of gas engineering and left behind such a host of friends among the consumers, and such perfect respect upon the part of the officials of the city which he supplied, as did General Hickenlooper. (Applause.)

Mr. Doty—The Committee on Memorials has requested Mr. John McIlhenny, a personal friend of the late Mr. Littlehales, to incorporate in the proceedings a memorial to Mr. Littlehales.

Mr. McIlhenny—Mr. Chairman and Members of the Western Gas Association: As our eloquent friend Capt. White says, it is well for us to pause, even in the hurry of business, to do honor to the men who have spent their lives in the gas business with honor to themselves and benefit to the interests they so well served. Those of us who were their contemporaries and now survive them have had our paths made much easier than they would have been, by reason of their example, skill and wisdom; and I would advise the many young men I see here to-day to follow in their footsteps. One of the men (one of the brightest stars) to whom I refer, whose demise we regret and whose memory we honor to-day, was Mr. Thomas Littlehales, who died at Syracuse, N. Y., Sunday, April 10th, 1904.

Mr. Littlehales was a member of the American and Western Gas Associations, and one of the most active and punctual attendants at the meetings of our organizations, always contributing to them the best information he had, and he was well informed. All of us knew he was kindly by nature, courteous in his discussion of any question before the Associations and willing to share freely with others his experiences. He took the time and trouble to come from Hamilton, Can., to attend the meetings. Attending the meetings regularly, he soon made the acquaintance of most of the members, and all who knew him respected him.

I have often heard him speak of the great benefits that grew out of our associating together, comparing notes and imparting to one another such information as we might have and that might be new, and no one was more willing to do so than he. One of the best things one can say of a man, when he belongs to an association for mutual improvement, is that he is willing to impart to others that which he has acquired by painstaking industry himself.

At one of our meetings, I met a gentleman of Hamilton, Can., where Mr. Littlehales lived many years. This gentleman, speaking of Mr. Littlehales, said the United States had acquired a prize in getting him and that Hamilton had suffered a loss. What could he say higher of the man than that? What your neighbors say of you is apt to be a pretty fair estimate of character and reputation.

He was a talented man, and with his children constituted, perhaps, one of the most talented families in Canada, as they were all gifted with unusual musical ability. They were in demand everywhere socially, and he was very proud and fond of his family.

It is a sad reflection that such a stalwart character and splendid specimen of physical manhood, when comparatively young, should be removed from among us. We cannot question these inscrutable acts of Providence. All we can do is to bow to His will and deplore our loss, which we sincerely do. We wish to convey to the bereaved family our sympathy and condolence, which I suppose will be done by our Secretary in due time.

Mr. Littlehales and I returned together from the meeting of the American Gas Light Association which was held in Savannah some years ago. We were drawn together on our way home, and happened to have a mutual acquaintance in a town about half way between New York and Savannah, where we stopped off for a day. It was on that occasion that I first found what a genial, splendid man he was—kindly, agreeable and companionable; and I do not wonder that his friends in Hamilton said that the community suffered a loss when he left that city.

It is well that tributes should be paid to the memories of those who have so well illustrated our profession, and I am sorry that I have not the eloquence of some of our members, or I surely would say more in regard to Mr. Littlehales, whose memory deserves to be kept alive in our hearts.

A friend has furnished me with some facts about Mr. Littlehales' life that I did not know before. He was born near Shrewsbury, England, October 15th, 1843. At twenty, he entered the gas business, under the late Mr. E. S. Cathels, who was then Engineer of the Crystal Palace District Gas Company, London. Four years later, he was appointed manager of the West London Junction Gas Works, which position he held for three years, when he was called to Hamilton, Canada, as Engineer and Manager of the Hamilton Gas Light Company. Mr. Littlehales remained in this position for 23 years, until 1895, when he became General Manager of the Syracuse (N. Y.) Gas Company. After two years' service with the Syracuse Company, he went into business for himself, under the title of the Penman-Littlehales Chemical Company.

Mr. Littlehales was a lover of nature in form, color and sound; his hospitable home was a center for musical and literary gatherings; a deep and thoughtful reader, and, withal, a good citizen and true friend.

Mr. Doty—The Committee on Memorials has requested Mr. C. H. Nettleton, of Derby, Conn., to prepare a tribute of respect to the memory of Mr. Henry B. Leach, of Taunton, Mass., an Honorary Member of this Association. Mr. Nettleton responded as follows:

I have been asked to say a few words in memory of one of our Honorary Members, and one who to many of us was an esteemed friend—Henry B. Leach.

Mr. Leach died July 25th, 1903, on the boat going to Nahant, with some of the Guild of Gas Managers, for an afternoon's outing. While sitting on deck talking to his friends he was stricken with apoplexy, and was gone almost instantly. He had left home that morning in the best of spirits, and up to the moment of his death was well and strong—active physically and bright mentally.

At the time of his death he had been in the employ of the Taunton Gas Light Company nearly 34 years, and for the last 21 of those years he had been the Clerk, Agent and Treasurer of that Corporation. How well he had performed the duties of his office the long continued success and prosperity of that Company prove beyond question.

His was a genial nature; everyone was glad to meet "Harry" Leach, as many knew him and as he was pleased to hear himself called by his old friends. To receive the warm grasp of his hand, to hear his hearty greeting and his good whole-souled laugh was indeed a great pleasure. Those who met him day after day, with all the cares and annoyances that come to everyone in active business, and which cause most of us to say and do some things which we wish afterwards had been left unsaid and undone—these bear witness to the kindly spirit of the man. His successor in office writes me that "We who were associated with him for many years have not the remembrance of an unjust deed or unkind word."

An editorial in a local paper said this: "Genial, kindly and hearty, he was a man who easily made and retained friends. A good citizen, always ready to promote anything which tended to the betterment of public and social conditions, he used his influence and his powers wisely and well. A kind husband and father, his home life was delightful and inspiring, and his friendship prized by all who knew its value. He will be generallly missed and sincerely mourned, and a full tide of sympathy will go out to the stricken household upon which the blow has fallen with crushing force."

High praise, and from those who knew him best. Mr. Leach was not a great man; he himself would not have claimed that, nor have allowed anyone else to have made such a claim for him; but he was genial, kind, modest and unassuming in thought and action, and honest, careful, industrious and conscientious in his work. These characteristics are those we prize most highly in all our friends and acquaintances, and which in the aggregation of all individual effort make much that is pleasant in our lives, and tend towards making the world a better place in which to live.

He leaves a memory which we all recall with pleasure, and we can all say, without any mental reservation, we are glad that Henry B. Leach has lived, and glad that we have known him.

To Mr. John R. Lynn, the preparation of a memorial to Gov. Asa S. Bushnell was assigned. Mr. Lynn spoke as follows:

Mr. President and Gentlemen of the Association: The death of Gov. Bushnell was a matter of regret to every good citizen of the State which he had served so well in places of honor and trust. His success with the Springfield Gas Company was almost entirely due to his great executive ability, to the characteristics of the man and to the confidence of those among whom he made his home. Gov. Bushnell was, I believe, one of the original members of the Ohio Gas Light Association; he had been for many years a member of the Western and was well known, especially to those of us who have made our homes in Ohio. He numbered among his friends all of the Ohio gas men and was known for his genial and kindly spirit and his remarkable ability as an entertainer; the meetings which we have held in Springfield will always be remembered with pleasure.

I will say this for his administration as Governor of the State of Ohio for, from my boyhoood, I have watched with particular interest the career of the public men of the State. I do not know of any administration that was so marked for its business ability and the general executive ability of the governor as the administration of Bushnell. His entire attention was given to the affairs of the State and it was remarked upon by people of all classes and the people of opposite political affiliation as well that his administration was particularly marked in that respect.

His was an ideal character. He was honest and above board in all things he did. His life was an open book. Governor Bushnell was a man who would have graced any position in life. In his work he was truly excellent and though he has gone from us he has left behind him a high reputation as a patriotic soldier, a wise statesman and a successful business man. In fact, in all things truly a man among men. He was a man of singularly bright understanding. And in closing this brief tribute to his memory let me say that neither I nor any other member of this Association or any other organization of men could give a tribute fitting to the memory of Asa S. Bushnell.

The President—You have heard the report of the Memorial Committee. I am sure we all feel obligated to the gentlemen who have spoken and given us of their knowledge concerning those good friends who have gone before. I rather take it as understood that the Committee shall be instructed or requested to send a suitable comunication to the family in each case. In the absence of anything to the contrary, I think that will be so assumed and carried out by the Committee on behalf of the Association.

On motion of the Secretary, the report of the Committee was accepted by rising vote.

The President called for the

REPORT OF THE COMMITTEE ON PRESIDENT'S ADDRESS,

which was read by Mr. Paul Doty:

To the Western Gas Association—Gentlemen: Your committee to whom was referred for consideration the President's address report as follows:

The President recommended that more consideration be given to an expression of our interest in our fellow members who have answered a greater roll call. We feel that especially, as the President recommended, it should be made the duty of the Secretary to obtain the required information for appropriate obituary notices, and that the question should be referred to the Directors of the Association with power to act. Any additional duties for the Secretary are properly within the authority of the Board. The Associatiou as a whole, it would seem to the committee, would not care to commit itself to a definite settled policy in the matter, but rest assured the Western Gas Association is ever mindful of its obligations and will render honor where honor is due.

It seems to the committee that consideration of the question of the establishment of an employment bureau, or of an information bureau, and also a clearing house for the exchange of idle apparatus should be left to the officers of the Association with power to act.

The committee is in hearty sympathy with the President's appeal for good taste in gas works' architecture. Too often the buildings are not what they seem. Architecture should appeal to the eye, and obviously should express the purpose of its creation. The lines of the building should convey some external conception of internal arrangement.

Your committee has carefully read and considered the expression of the President on the matter of Association work and the plea for the unity of Gas Associations. This subject is opportunely to be presented for consideration at the Gas Congress which will assemble to-morrow. Your committee does not wish to forestall the discussion of the subject before the Congress. In view of the fact that every Association has within itself an inherent power to create a new Association, or a united Association, it seems to your committee it would be wise to postpone any discussion of the subject at this moment, but to pledge the Association to a consideration of the subject by the appointment of a committee by the incoming President of the Association to co-operate with a committee of other Associations, if it should develop that the Congress of Gas Associations makes the recommendations for the appointment of such committees by the various individual Associations taking part in the Congress.

Your committee desires to express its appreciation of the splendid work of your President, and the Association is to be congratulated upon its good fortune in having so able, energetic and untiring a worker as Frederick H. Shelton.

Your committee pledges that the obituary notice of the President will be all that he may desire, but expresses the hope that that obituary notice will not be required uutil long after the benevolent assimilation of the numerous Gas Associations of the United States shall have been accomplished. Respectfully submitted,

PAUL DOTY,
HENRY L. DOHERTY, } Committee.
ROLLIN NORRIS,

*Discussion.*

The President—You have heard the report. The only thing I want to interject, before putting it to motion for acceptance or otherwise is, it seems to me the recommendation that the matter of forming a union of the different Associations be taken up to-morrow in the Congress is an admirable one. The Congress is a convening of the representatives of all Associations, and if the ideas that I have suggested, and strongly believe in, are on lines which are to find a response, to-morrow's meeting is the place where such response naturally would be found; wherefore, if this Association should carry out the recommendation and see to it that the subject is properly discussed before the representatives of all the Associations, in connection with the paper on Gas Association work, it is a right and admirable way to handle the matter. Personally I am very glad to see the Committee so report.

On motion of Mr. McIlhenny the report was adopted and its recommendations concurred in.

[To be Continued.]

## The Bertrand-Oerlikon Retort Charger and Discharger.[1]

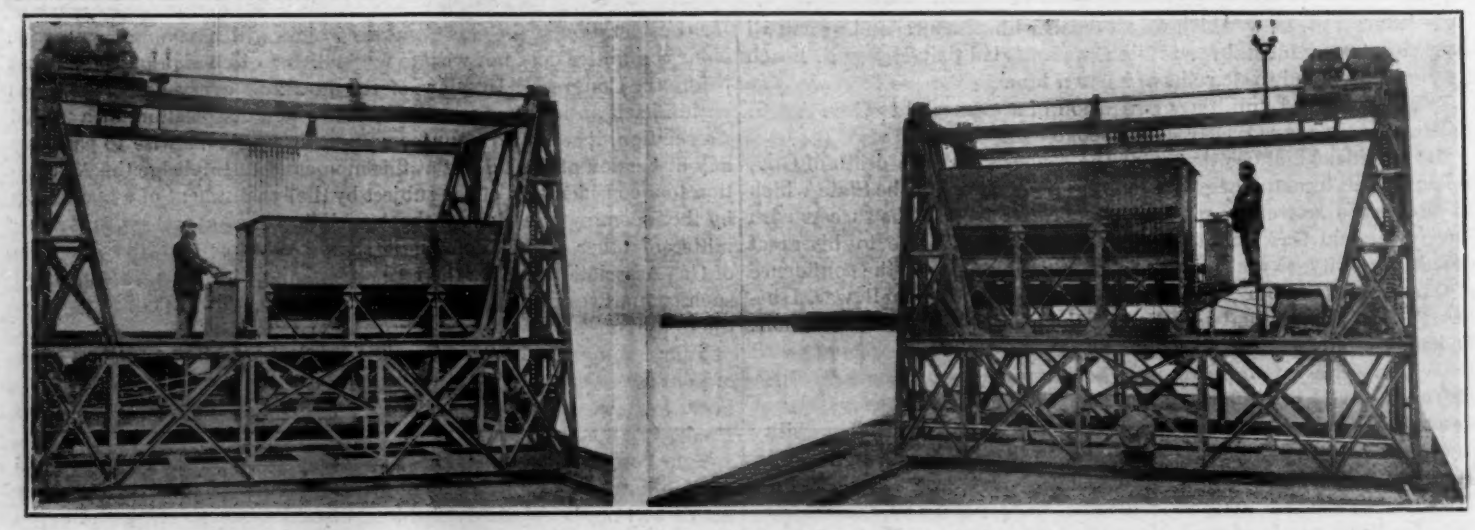
At the late meeting of the Société Technique du Gaz en France a paper describing the retort charger and discharger devised by M. Bertrand, the General Manager of the Paris Gas Company, and constructed by M. Oerlikon, of Zurich, was read by M. Thelliez. The following are the principal portions of the communication, which was accompanied by the illustrations here reproduced:

The machine is constructed to make three independent movements:

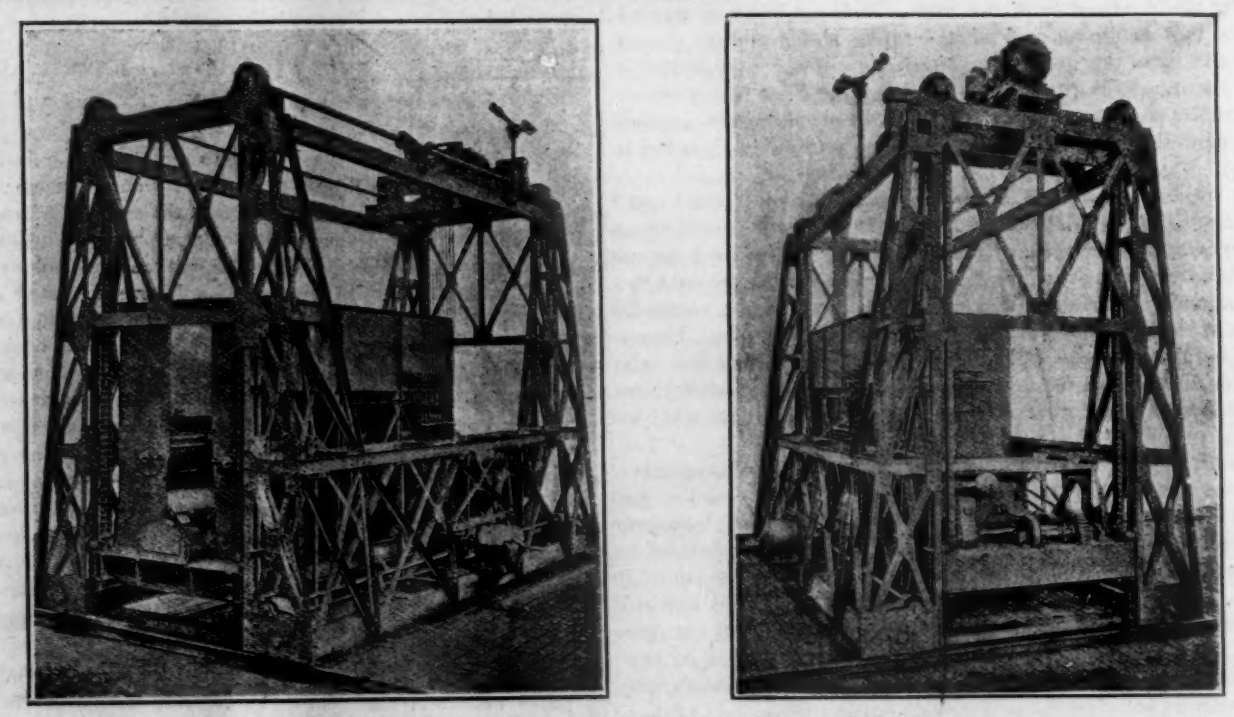
(1) The drawing and charging of the retorts; (2) the raising of the appliance to their vespective levels; and (3) the longitudinal motion from one setting to another. The operations of drawing and charging are effected by means of a scoop with movable bottom. It consists of two parts—the upper being the frame and the lower the bottom. The two parts may be manipulated either together or separately. In order to push the coke out of the retort, the end of the scoop has upon it a shield turning upon a horizontal axis in such a way that when the upper part of the scoop is drawn from the retort, the shield slides over the charge which has just been deposited. The coal for filling the scoop is contained in two hoppers mounted upon the machine. They have a combined capacity of 60 cwt.; and by means of regulating mechanism, the quantity of coal allowed to fall into the scoop may be varied from 3 cwt. to 3¾ cwt. The bottom of each hopper is closed by a cylinder having 4 flaps furnished with a bolt. When the frame returns after its run into the retort, the bolt opens automatically, and the two cylinders make a half turn, by which the scoop is filled.

The charging operation is performed as follows: The machine having been brought up in front of the setting, the operator turns the releasing handle in the direction indicated. Thereupon the engine which works the scoop is started, and transmits its motion by means of an endless screw to two toothed wheels which gear into a single pinion.

1. *Journal of Gas Lighting.*



Views of the Machine from Opposite Sides.



Front and Back Views of the Bertrand-Oerlikon Retort Charger and Discharger.

During the operation these are engaged or disengaged automatically, and thus transmit motion to the cams of the endless chain to which the bottom of the scoop is attached, and also to a drum upon which runs a cable fastened to the upper part of the scoop. The toothed wheel imparts to the scoop a speed of about 33 feet per minute; and the forward motion continues until the lever actuated by the releasing handle returns automatically to its original position. This stops the scoop when it has been inserted enough into the retort. At this moment the frame is automatically bolted, so that the upper part of the scoop cannot be drawn out unless the bolt is again liberated. The handle is then manipulated to effect the return movement; the result being the reversal of the motion of all the mechanism. The bottom of the scoop slides from beneath the frame, and in withdrawing itself allows the coal to fall upon the floor of the retort. As soon as the frame has made its return movement, the bolt of the cylinders is drawn, the cylinders turn, the scoop is filled with coal, and the starting lever returns automatically to its position of rest. It will thus be seen that the manipulation of the appliance by the workman is a very simple matter; and the entire operation only occupies one minute.

The second movement of the machine is to bring it up to the level of the different retorts to be dealt with. This is effected by means of raising mechanism. The scoop and the portions of the machine by which it is operated, together with the two coal hoppers, are mounted upon a platform suspended by four endless chains. Working at a speed of rather more than 6 feet per minute, it is easy to stop the platform at exactly the height required. Movement is imparted to it by an engine fixed on the upper portion of the woodwork of the machine, and the power is transmitted by endless screws rotating two spindles carrying chains. The platform is kept at any desired height by means of a counterpoise brake; and it can be lowered from one line of retorts to another in about 15 seconds. Horizontal motion is given to the machine by a third motor, with which a speed of about 65 feet per minute may be obtained.

The originality of the system consists in the use of one and the same machine for effecting the two operations of charging and discharging retorts; thereby not only reducing considerably the cost ot labor, but doing the work in the minimum of time. A bench of five settings of eleven 12-foot through retorts has been constructed to utilize the machine; and an average of 3¼ cwt. was reckoned upon—making one metric ton of coal carbonized per retort in 24 hours, or (say) 10 tons per setting. In view of the rapidity with which the operations are performed, it is estimated that eight similar settings could be served by one machine, and that consequently 80 tons of coal could be carbonized per day.

For feeding the furnaces, a mixture of coal and breeze is used. An objection had been raised to the machine on the ground of the weight of the scoop in relation to the resistance of the retort. In reply to this, the author pointed out that, though a scoop when charged does not weigh less than 13¾ cwt., this weight is spread over the entire length of the retort, which is supported at distances of about 9 inches. Moreover, the retorts are made 2¾ inches thick.

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The Muncie (Ind.) Trust Company has been appointed temporary receiver of the Wabash (Ind.) Gas and Oil Company and of the Muncie Gas Light and Fuel Company.

[Continued from Page 10.]

## Contents of the Question Box as Read at the Twentieth Annual Meeting. Ohio Gas Light Association, Cleveland, O., March, 1904.

No. 53. "What is the best means of enriching coal gas with oil, and and what results can be obtained in candles per gallon?"

"In my experience I have found nothing so efficient to accomplish the object of the above inquiry as that of making oil gas in *one* of the retorts of a coal gas bench, the rest of the retorts of which are regularly charged to make coal gas. Averages of work carefully kept for several years demonstrated that, by the method I employed, the result in candles per gallon of oil were remarkable, viz., about 2,644 candles. In other words, using Youghiogheny coals alone, I obtained an average of 10,976 cubic feet of 16-candle gas per ton of 2,240 pounds But, when using the same kind of coal in the same retorts and substantially with the same men, but in addition gasified on an average 4.8 gallons of 63° gas naphtha per ton of coal carbonized, I obtained an average of 12,163 cubic feet of 19.66-candle gas per ton of coal with the oil mentioned. This will figure out, as commonly expressed, the number of candles mentioned above. Or it brings the results to equal 45.30 pounds of sperm, as others might figure it. As the weight of oil used was only 30 pounds per ton of coal, and the additional gas alone approximates 45.46 pounds, not taking into the calculation the additional 3.66 candles by which the total of the coal gas was enriched, my statement must appear paradoxical; and yet it is absolutely correct, as I have every reason to believe. It is moreover an important fact, I think; and while I have not answered the question, it may interest members of the Ohio Gas Light Association to know how, in detail, I obtained such results. With the permission of the Editor of the Question Box I will herewith describe the method, which I do not designate 'my method' because, although I have successfully used it for a number of years, I first learned it when Assistant Engineer of the then Metropolitan Gas Light Company, of New York city, under the direction of my friend, Mr. I. Herzog, then that Company's chief engineer. The annexed drawings will serve to better illustrate the subject. Fig. 6 represents a portion of the front elevation of a bench of 5's (not drawn to scale), in which *R* is the left-hand, lower retort section, back of the lugs which usually support the lid and cotter bar. The black circle *P* represents a piece of 3-inch cast iron pipe, laid loosely into the retort and extending from the front end to within about a foot of the back or 'seat' of the retort. *B* represents a number of firebrick laid around the said pipe so as to cover it, and in part protect it from the otherwise too intense heat of the retort. *U* is a union and reducing bushing or coupling (in which only leather washers should be used), to allow of readily connecting or disconnecting the oil supply pipe *E*, which leads to the small oil measuring tank *O*, set at any convenient point some distance from the retort bench. *K* is an iron stopcock; *A*, the ascension pipe leading from the retort to the bridge and dip-pipe, and so on to the hydraulic main. *V* is a valve on the oil tank and *G*, a small gauge by means of which the contents of the oil tank can be seen and read off, without removing the tank cover, which should be on said tank for safety's sake, as well as to keep out dust and other dirt.

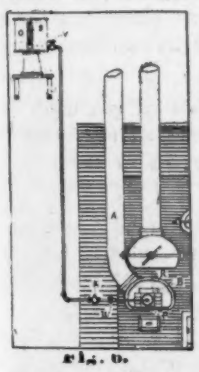

Fig. 6.

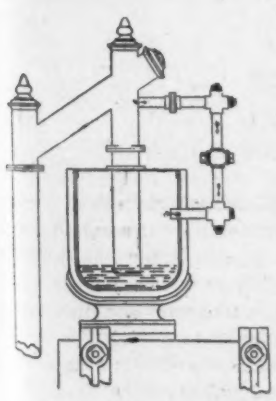

Fig. 7.

"Fig. 7 shows a very essential feature of the whole arrangement, and without which the results previously mentioned may not be obtained. This figure represents a hydraulic main in section, showing also a portion of the ascension, the bridge and dip-pipe, and a by-pass to the seal of the said dip-pipe. This by-pass is best made of 2-inch wrought iron pipe with the crosses, plugs, flange or other union and a cast iron cock. After the preliminary work has been done, it is always the work of only a few minutes to change from making coal to oil gas, or vice versa. The preliminary work consists of, first, drilling a hole on the side of the retort mouthpiece, back of the lid lugs and about 4 inches from the bottom. This hole must be large enough to freely pass a piece of ¼-inch gas pipe; and it can then be closed with a lump of luting clay until wanted. The ¼-inch pipe is provided with an ell and a nipple about 6 inches long, to project about that distance into the cast iron pipe in the retort; and after this is done, and the union screwed up tight, the opening around the ¼-inch pipe in the 3-inch pipe is also closed with luting clay, so that whatever oil is run into the retort must run toward the rear end of it; for the same reason it is well to raise the outer end of the cast iron pipe, by laying a split brick under it. The lid of the oil retort ought to have a ¼-inch hole, fitted with a plug, in it, so that one may look into the retort occasionally, if desired, to observe the heat and gas made. After all is ready, the cast iron pipe laid into the retort and covered, the oil connection made, etc., the oil is turned on, and if crude oil is used, made to feed into the retort at the rate of about 8 gallons per hour (naphtha 10 to 12 gallons per hour), and the by-pass opened. Of course, this by-pass must be closedwhenever the lid is removed from the front of the retort to clean possible stopped pipes, or for any purpose, so as to prevent drawing air into the hydraulic main. The rate of flow of oil can easily be established by watching the gauge on outside of oil tank and timing the flow of oil per 10 or 15 minutes. After this is established the stopcock *K* should be marked with a file or any sharp instrument, so that thereafter, when shut off, it can be quickly turned on again without further timing of it.

"If the coal gas is to be enriched only from 3 to 4 candles, one oil retort will serve 10 to 12 coal retorts; but when even only one bench is in operation this method can often be employed to advantage, especially if an increase in supply of gas is imperative and a second bench cannot be gotten ready quickly enough, or else would be too much. I chose a bottom retort, because bottom retorts generally are not as hot as middle or top retorts, and too much heat is not desirable for the oil retort, although one can easily keep dowu the heat in same by running enough oil into it. For a like reason, the attendant of a coal bench in which there is one oil retort must fire up for all he is worth to keep the heat in the bench, for the oil retort will take more than its proportion of heat. The heat in the coal retorts must be the fireman's gauge for keeping up the heat in the bench. If the coal retorts are hot enough, the heat in the oil retort is easily regulated by the flow of oil. The coal retorts may be white hot, as a retort house fireman might term it; but the oil retort should be kept at a dark red. Taking out the plug in the oil retort lid, the gas issuing therefrom should be of a brownish color; if black, the retort is too hot or not enough oil running in; but these details must be learned by practice and experience, and if my general directions are followed the results are sure to be obtained. The proper running of the exhauster is another point absolutely necessary to the successful operations described. In the AMERICAN GAS LIGHT JOURNAL, March 23, 1896, on page 455, will be found illustrated a cheap and accurately reliable exhauster engine governor of my invention (not patented) which will do the work well for anyone who may care to use it. The exhauster should be run so, no matter what the seal may be, as to have not over about one-tenth pressure in the retorts, which means sometimes a very slight vacuum in the hydraulic main, or mostly just an even balance. But though the pressure may be a tenth or two more, still the results described are sure to be obtained if my directions are followed.—FREDERIC EGNER."

"I am using a hot scrubber located close to hydraulic main. Where the warm liquor from the main is again brought into intimate contact with the warm gas previous to the gas entering the scrubber, I introduce gas naphtha in a small stream or 'dropping,' and we find that the use of ½ gallon of oil to 10,000 cubic feet will increase the illuminating power of the gas 2-candle power.—JOHN J. POWER."

"See answer to No. 35.—G. FALKENSTEIN."

No. 54. "What method can be used for enriching gas with tar?"

"At the meeting of the Ohio Gas Light Association, in March, 1887, Mr. E. Hamlin, of Wilmington, O,, described a successful method employed by him for enriching gas with tar, and his paper thereon was printed in the AMERICAN GAS LIGHT JOURNAL, May 2d, of that year.—IRVIN BUTTERWORTH."

"See answer to No. 35 —G. FALKENSTEIN."

"The 'Peebles Process" accomplishes this. In some places tar has been run into thick paper bags and charged into retorts.—JAMES FERRIER."

No. 55. "How can waste heat from coal benches be most advantageously used?"

"This question of heat economy can, I believe, be best solved by the use of the full-depth regenerative bench in any works of sufficient capacity to warrant the introduction of the same.—CLARENCE S. LOMAX."

"First, by recuperation; second, by utilizing waste heat from free

firing bench to heat water in boilers generating steam to be used around the gas works.—JAMES W. DUNBAR."

"By erecting one stack for the benches and drawing the flue gases through an economizer.—H. L. RICE."

No. 56. "Are there any gas engines in satisfactory use in gas works for driving exhausters, and how are they regulated for a fluctuating gas make?"

"Yes; there are many used for the purpose in Great Britain. The engine maintains a steady speed sufficient to take care of maximum make. The fluctuation is easily taken care of by the use of an equilibrium valve operated by a governor connected between inlet and outlet pipe of exhauster. R. & J. Dempster, Gas Engineers, Newton Heath, Manchester, England, build exhauster machinery operated by a gas engine.—WALTER THOMAS."

No. 57. "What is the best means for ventilating a retort house?"

"Ordinarily a properly designed louvre does the work very successfully.—HENRY I. LEA."

"The chief cause of trouble in the ventilation of a retort house is the mingling of steam with the smoke. In considering any ventilation scheme, first arrange to remove your steam from the point at which the coke is quenched, mechanically. The smoke can then be taken care of by a number of different methods efficiently.—R. B. BROWN."

"At Detroit, in our retort house containing benches of 8's and charging and drawing machinery, the coke is drawn on to an inclosed and inclined platform in the basement immediately under the charging floor, and running the full length of the stack, where it is quenched by means of a hose, and whence it is drawn when quenched through openings in the side of the inclosed platform into buggies running on tracks laid on the basement floor under the lower edge of the platform. During the time of drawing and quenching a large power-driven exhaust fan, connected by a large pipe with the inclosed platform, withdraws all the smoke and steam from the same, allowing practically none to escape either into the basement or into the retort house above.—IRVIN BUTTERWORTH."

No. 58. "What is the cheapest method of removing from gas, sulphur compounds other than $H_2S$?"

"No method now in common practice among large gas companies will completely remove $CS_2$ and organic sulphur compounds from the gas. Some patented pieces of washing and scrubbing apparatus, using caustic ammonia liquor in connection with sulphide of lime and iron oxide purifying boxes, claim to reduce all sulphur compounds to a very small per cent. What the cheapest method would be would depend very much upon local conditions, cost of lime, expense of handling and disposal of fouled material. Most gas companies prefer to wash, scrub and purify the gas free from all ammonia, tar and $H_2S$, removing at the same time all the $CO_2$. $CS_2$ and organic sulphur compounds possible; then enriching the gas, if necessary, rather than attempting to remove such a small per cent. of impurities at a great cost. If the party asking this question will refer to the different papers on this subject read before the Gas Associations, or to the London Gas Referees for the Patterson scheme of lime and iron oxide purification, he can figure out a method to suit local conditions.—W. B. CALKINS."

"Owing to our use of Kansas coal it becomes imperative for us to employ some means for removing sulphur compounds other than $H_2S$ from the gas. Sulphided lime is the only agent we have employed to effect this removal. The scheme of operation is as follows: After the gas has been washed and scrubbed, it passes through a series of 4 oxide purifiers and 4 lime boxes, thence direct to the station meter. Assuming that the lime boxes are clean to begin with, the oxide purifiers and the first lime box of the series are by-passed, allowing the last three lime vessels to remove the $CO_2$ and $H_2S$. Owing to the comparatively large amount of $H_2S$ present in the gas, the second lime box, as well as part of the third, quickly becomes sulphided. The fourth lime box serves as a check. When the $H_2S$ begins to show at the middle of the third lime box, the oxide purifiers and the first lime box are then turned on. The oxide purifiers now remove the $H_2S$ and the first lime box the $CO_2$, while the second and third lime boxes are in proper condition to take out the other sulphur compounds. When the first lime box becomes carbonated it is renewed and placed last in the series, and the one that was second becomes first. The $CO_2$ coming into this box drives out the $H_2S$, which serves to sulphide the vessels on ahead. But owing to the fact that not all the $H_2S$ is driven out by the $CO_2$, it becomes necessary to by-pass the oxide purifiers for 2 or 3 hours every time a lime box is renewed. Our lime boxes are cleaned and renewed in rotation and the above method seems to be the best we have tried so far. At the time of changing boxes there are slight fluctuations in the amount of sulphur present in the purified gas, but since last November we have had very little cause for complaint.—FRED HAUENSTEIN."

"English practice removes $CS_2$ with lime previously fouled by $H_2S$. When the reduction of $CS_2$ is imperative this foul lime method is satisfactory though it cannot be called cheap, and it requires a large investment, much sxperience and careful handling, and entails the removal of $CO_2$ also. $CS_2$ can be removed with a solution of lead hydrate in caustic soda, but this is utterly impracticable on a working scale. Some $CS_2$ is removed in thorough scrubbing with ammonia liquor; compare my paper on 'Gas Works' Chemistry,' Wisconsin Gas Association, 1904. Considerable $CS_2$ is absorbed in the boxes under certain circumstances.—H. B. HARROP."

No. 59. "How is the amount of superheating surface in a Lowe water gas set determined, assuming that naphtha is the oil to be used?"

"In a general way the superheater area is estimated to balance the generator, viz.: When the generator fire is in the proper condition for gas making, the superheater brick shall be at the proper temperature for fixing the gas. The proper area has been arrived at largely by experiment.—PAUL DOTY."

"In best modern practice, the total surface of the combined checker-brick in carburetter and superheater (exclusive of the side walls of these shells) is about 28 square feet per gallon of oil used per hour. A part of this surface is excluded from direct contact with gas because of the contact of the bricks with one another; the brick surface directly exposed to the gas is about 20 square feet per gallon of oil used per hour. This is for even heavy oils. If any oil, as for instance naphtha, were being used which required less work in fixing, this would better be effected by changing the heat than by changing the amount of checker-brick.—ANONYMOUS."

No. 60. "What boiler horse power would be required per million cubic fect of gas made per day, for a water gas plant and for a coal gas plant, respectively, of one, three and five million daily capacity?"

"One hundred-horse power per million cubic feet of gas made is about the average boiler power needed, but all works should have at least 2 boilers and large works should have 1 extra in every 5.—LEONARD FITZGERALD."

"Reference: Paper on 'The Steam Consumption in a Water Gas Plant,' read by Alten S. Miller at the 27th annual meeting of the American Gas Light Association, and published in the AMERICAN GAS LIGHT JOURNAL, October 23, 1899, page 652.—C. O. G. MILLER."

"In the proceedings of the American Gas Light Association for 1899 will be found a paper on 'Steam Consumption in a Water Gas Plant,' prepared by Mr. Alten S. Miller. He states that the consumption of steam per 1,000 feet of gas made was 67.34 pounds, this including no steam for heating holders and plant. This is in round figures, 2 boiler horse power per 1,000 feet of gas made per hour. For works of the size specified in the question, the working boiler capacity required in winter would probably be, per 1,000 feet of maximum make per hour, for water gas works, 2.5-horse power, for coal gas works, not using steam for stoking and conveying machinery, 1.5-horse power, and for coal gas plant requiring steam for stoking and conveying machinery, 2-horse power.—ANONYMOUS."

(To be Continued.)

(Concluded from Page 12.)

## Lost and Unaccounted-for Current.

The total sales are figured up at the end of each month, and as meters are read in three different divisions at different times, the results do not exactly correspond to the monthly output. The bills for one-third of our consumers cover a period from the first of one month to the first of the next month, one-third from the 10th to the 10th, and one-third from the 20th to the 20th. This variation might amount to considerable in one month, but, as everything is figured accumulative from month to month, the records are very accurate when figured over a space of several months.

After this full explanation of the methods for arriving at the known losses, it will be interesting to note the results obtained in some of the feeders for the past year. There are 24 different feeders, on all of

which the above records are kept up from month to month. The author has plotted graphically the losses on some feeders, showing variation of losses from month to month and the gradual but steady decrease in the unknown losses. The first curve (Fig. 4) is that of a resi-

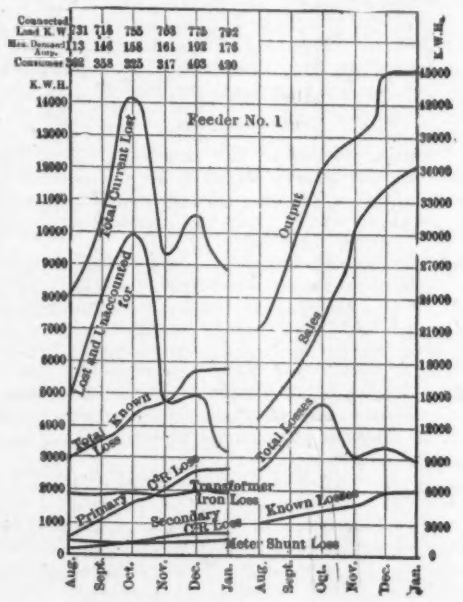


**Fig. 4.**—Curves of Feeder Losses.

dence feeder, which is designated as 1 West. It will be noticed that the output and sales have increased very rapidly. A slight hump will be noticed in the output during October; this is due to some unknown loss, as the curve of sales does not show this characteristic, neither does the curve of known losses. It will be noticed that both the primary and secondary losses show a steady increase due to the increase in the output. The transformer iron loss remains about the same and so do the meter shunt losses. The relation that the sales show to the output varies from 59.3 per cent. to 80.5 per cent., being almost a steady increase from beginning to end, the unknown loss increasing at about the same rate as the output for the first two months, dropping off the next month, and then remaining about the same for the remainder of the period, although both the sales and output increased considerably.

In the accompanying table is a tabulation of an alternating-current feeder for a period of six months. During that time the feeder was changed from a 1,000-volt individual transformer system to a 2,000-volt with a 3-wire secondary network, with the exception that there are still some instances where individual transformers are used, due to the sparsely settled territory it covers.

*Table Showing Economy of 3-Wire Over Individual Transformer System.*

| Month. | Output. | Sales. | Per Cent. of Output. | Lost and Unaccounted-for. | Per Cent. of Output. | Transformer Iron Loss. | Per Cent. of Output. | Primary C A Loss. | Per Cent. of Output. | Secondary C A Loss | Per Cent. of Output. | Meter Shunt Loss. | Per Cent. of Output. | Consumers. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 19,250 | 7,778 | 40.4 | 4,877 | 25.4 | 5,940 | 30.9 | 222 | 1.1 | 138 | .7 | 295 | 1.6 | 273 |
| 2 | 15,970 | 6,630 | 41.5 | 2,235 | 14.1 | 6,475 | 40.5 | 229 | 1.4 | 92 | .6 | 309 | 1.9 | 277 |
| 3 | 20,042 | 10,506 | 52.5 | 6,140 | 30.6 | 2,560 | 12.8 | 373 | 1.8 | 150 | .7 | 313 | 1.6 | 281 |
| 4 | 35,320 | 21,166 | 60.0 | 9,417 | 26.6 | 2,390 | 6.7 | 1,153 | 3.3 | 463 | 1.3 | 721 | 2.1 | 660 |
| 5 | 40,140 | 28,480 | 71.2 | 6,421 | 16.1 | 2,441 | 6.1 | 1,440 | 3.5 | 580 | 1.3 | 779 | 1.0 | 692 |
| 6 | 40,940 | 29,113 | 71.2 | 6,435 | 15.7 | 2,425 | 5.9 | 1,503 | 3.6 | 605 | 1.5 | 859 | 2.1 | 771 |

This tabulation shows several very interesting things. During the first two months the individual transformers were done away with and replaced with a 3-wire network showing a reduction in transformer iron losses from 6,475 kw-hours to 2,560 kw-hours, a decrease of a little over 60 per cent. At the same time the lost and unaccounted-for has taken a jump of nearly 170 per cent. The output and sales increased considerably the same month, due to combining another feeder with this one, adding 387 consumers, which were changed over at the same time to a 3-wire distribution. In this instance the sales were increased to nearly double the original amount and the transformer iron loss was decreased to about one-half the original amount. The primary and secondary resistance losses were increased considerably, due to the increase in the output of the feeder.

A complete record sheet is kept for all the rest of the feeders. One of the interesting things on this feeder is that the watts per lamp of output remained about the same for the entire year, while the watts per lamp of sales increased during the same period to nearly double. The sales increased from 41.6 per cent. to 83.5 per cent., the known losses remained about the same, while the unknown losses decreased from 48.4 per cent. of output to only 5.22 per cent.

The loss and unaccounted-for current has been systematically followed up and decreased very materially. This unknown loss is due to leakage through grounds, faulty meter registration, errors and theft. These losses have been plotted graphically as shown in Figs. 5 and 6.

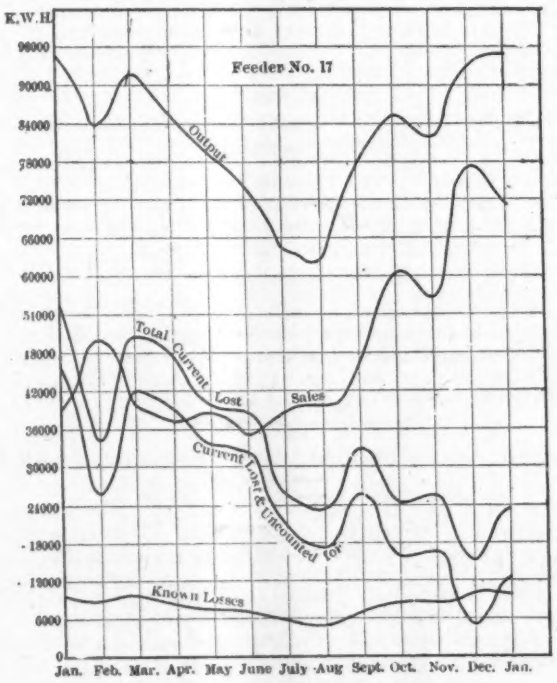


**Fig. 5.**—Curves of Current Losses.

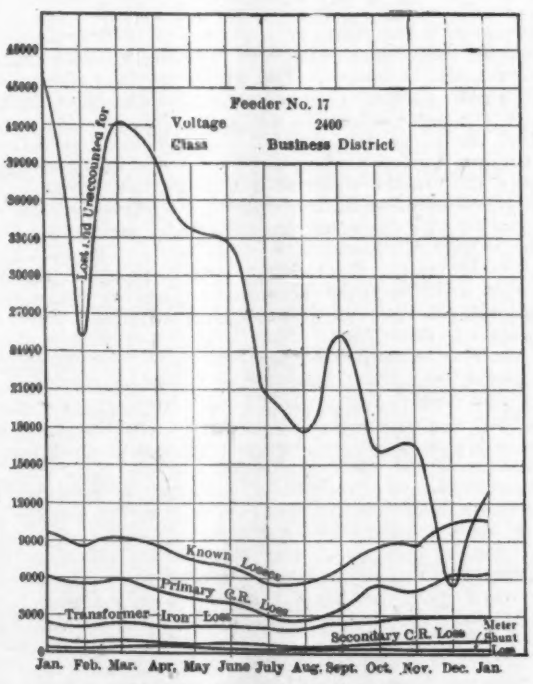


**Fig. 6.**—Curves of Current Losses.

Each circuit is tested for grounds, and when found these are traced down and removed.

The greater part of the loss and unaccounted-for current was found to be due to thefts. These were found by systematic inspection of service loops and interior wiring. Theft of current was found to be done usually by tampering with the wiring, removing pressure wires and jumping out meters, installing lamps ahead of the meter, and in some instances tampering with the meter so as to retard its rotation. Some of these things are very difficult to find, especially in cases of concealed wiring. Some cases of slow meters were found by placing a check meter on the secondary of a transformer feeding a 3-wire district, making an isolated district of it by opening up the junction fuses on each

side of the transformer. There are quite a number of ampere hour meters on the circuits, which accounts for some of the lost and unaccounted-for, as an ampere hour meter will not start on less than two to four 16-candle power lamps. A check meter was placed on one district having 9 ampere hour meters and eleven integrating wattmeters. The results were as follows:

| | | |
|---|---|---|
| Registered on house meters..... | 331.5 | kw-hours. |
| Shunt loss on 11 meters..... | 6.14 | " |
| Total ..... | 337.64 | " |
| Consumption as shown by check meter. | 367.3 | " |
| Loss..... | 29.75 | "or 8.1 pr. ct. |

About the only absolute method of preventing theft of current, and as yet only adopted in isolated instances, is to place all meters on the pole. This could be accomplished in the business districts of the city by placing a number of meters in one box on a pole and running all services from this box and, where possible, bunching the wires in one cable. This would be especially advantageous where feeding a large number of consumers in a large business block, and where the running of such a cable would not be more objectionable than the present practice of bussing such a building. The principal advantage of such a system would be the impossibility of stealing current from the light company. It would be getting paid for all current distributed and the losses would certainly be materially and permanently decreased.

This completes the discussion of all the principal items relative to the calculations of lost and unaccounted-for current. The importance of an analysis of the output of an electric station can be readily seen by the results given in this paper, and in the majority of instances such an analysis will show such startling results as will lead to investigations that will pay for the time and trouble many times over. In no other way about a central station can money be spent more profitably.

## Some Recent Applications of Electricity on a Small Scale.

By HOWARD S. KNOWLTON, in *Electricity*.

The adaptability of electricity to all sorts of purposes is illustrated daily in the progress of the art. One of the latest applications is in the photographic dark room. For a long time the amateur photographer has been obliged to use greasy candles or ill smelling and explosive oil lamps in his ruby or orange colored dark room lanterns, with the resulting vitiation of the atmosphere, sacrifice of cleanliness and risk of fire. High candle powered incandescent lamps have given almost too much light for developing purposes, but recently a 1-candle power lamp has been devised which fills the bill perfectly. The lamp is made to set into a small socket mounted on a brass standard about 8 inches high, and is placed in the focus of a reflector which throws the rays directly upon the developing pan. The lamp bulb is of either ruby or orange colored glass, as desired. The brass standard is mounted upon a small box which contains three open circuit cells, these cells supplying current to the lamp at about 4.5 volts. The battery may be run about one-half hour at a time without injury, and may be used 30 or 40 times before replacement. The three cells are fastened together in one solid body and may be replaced in a few seconds in case one desires to use the dark room for an hour or more. No adjustment of wires is necessary, contact with the lamp circuit being made automatically by two small brass springs attached to each battery. A small single point switch controls the lamp. The reflector is made to hold a screen of any desired color, in addition to the lamp bulb. The cost of the apparatus, with one battery of three cells, is about $3.50, and the price of additional batteries is 50 cents each. The cost of operation is thus about three cents per hour as against perhaps one cent for tallow candles, but the advantages of the electric lamp are so patent in point of comfort, convenience and safety, that a difference of two cents per hour is a small consideration, in view of the total cost of chemicals for developing, the cost of plates, films, and necessity of even temperature and absolute cleanliness if good work is to be done.

An interesting instance of the use of electricity in detecting tampering with telephone cash boxes occurred not long ago in Boston. A telephone box in one of the Back Bay hotels was robbed, and the company replaced the box by one which was electrically connected with the Back Bay Police Station, only a few hundred feet away. Two boys shortly afterward broke into the box again, causing a lamp to light in the police station. They were promptly captured at the telephone booth by the officers.

Electric candle lamps and cylindrical exploring lights have been on the market for some time, as have the greatest variety of delicate dental and surgical lamps. In going about closets, clothes presses, hallways and other rooms after dark, the advantages of these safe, cool and cleanly means of illumination are striking. The electric cigar lighter is also familiar, as is the small battery lamp of one or two candle power which so readily indicates the time of night when attached to a clock or watch and connected with a push button at the bedside. Still another application is the miner's flash light with large lens and bell reflector, doing away with the danger of explosions and the discomfort of grease and oil.

Every user of Welsbach gas burners will welcome the advent of an electric lighting device, which ignites the gas on being held over the chimney, through the incandescence of a hot wire; this does away entirely with the dangerous use of matches and tapers. A similar apparatus for lighting gas stoves is now on the market entirely eliminating the chance of burns or conflagrations in the use of this common domestic appliance.

The installation of electric bells in street cars for signaling motormen on the approach of stopping places has grown so rapidly in the past year or two that a car lacking the push button equipment may readily be said to be far behind the times. The convenience of this device to passengers can hardly be overestimated, and its simplicity justifies its addition to the already overburdened electric car.

In drying photographic plates the fan motor offers a means of greatly accelerating the process. This may often be done in 20 minutes or half an hour, by setting the plates in front of an ordinary 110-volt fan motor, whereas if natural drying were resorted to 4 or 5 hours would not be an uncommon requirement. Care must be taken in utilizing fan motors in this way, however, not to allow dust to accumulate upon the film of the plates as a result of the blowing process. Another use of the fan motor which became common in the past winter was the prevention of the frosting of windows. The powerful current of air from a fan motor causes all deposited moisture to evaporate so rapidly that the accumulation of frost is impossible.

The operation of sewing machines by means of small electric motors has been gathering in extent for several years past, and the elimination of physical wear and tear produced thereby is bound to constantly increase the favor with which mechanical driving is held by seamstresses. It is marvelous how readily electric driving can be applied to every sort of moving mechanism, from the printing press to the advertising toy which appears in the store windows, and it is interesting to think of the sub-divisions which the energy of a great central station undergoes in distribution, whether it be in the lighting of an auditorium or the driving of a dental drill.

An ever widening field of application is found in the use of changeable and fixed electric signs of all kinds of shades and designs. The employment of colored lights in this connection opens the door to a veritable fairyland of scenic and striking effects which are easily possible with electricity. No other form of energy is safer or as flexible, if properly controlled. The triumphs of ingenuity shown in the illumination of the world's great expositions may be repeated in small scale advertising with the fullest measure of success.

A system of checking the work of watchmen in factories, mills, banks, public buildings, etc., is being applied to a considerable extent at this time. It involves few, if any, new principles of design, the improvement being in the line of its application. A series of numbered alarm boxes are placed in each establishment equipped and connected with a central office, usually the headquarters of one of the telegraph companies, where a man is constantly on duty during the night. As the watchman makes his rounds he "pulls in" each box at a specified time. In case the central office does not get regular signals from its customers supplied with the system, police assistance is quickly dispatched to the scene. Things cannot go wrong for more than a few minutes with this system of detection.

The "push button" engine stop is another device which is being extensively utilized of late. This apparatus stands between broken governor belts and the complete destruction of many an industrial power plant in cases where the attendants are unable to shut off steam or water quickly in sudden emergencies. Push buttons located at convenient points in the plant operate to start a small electric motor attached to the controlling valve which admits the steam or water supply in case of danger. The system may be made automatic if desired, so that an engine or water wheel may be instantly shut down in case the speed exceeds the limit for which it has been set. Printing presses are also amenable to the action of a push button system of stopping, and cases are on record where life and limb have been saved through the quick stopping of machinery possible with the distributed system of controlling push buttons.

It is often the custom of men concerned with "heavy work" and large applications of electricity to scoff at these smaller uses of current, but the same laws are illustrated in the simple push button circuit as are found in the transmission of power over lines 100 miles long, and a high order of skillful designing is equally essential for successful operation. Progress is constantly being made in the realm of small currents as well as in the domain of great powers, and the flexibility of applied electricity is as well exemplified in the telephone plant as in the multiple unit system of railway train control. The world is richer and civilization a step farther from the crudeness of aboriginal barbarism, for every new invention, small or large, which can be applied to the welfare of humanity, and the man who sneers at the smaller uses of electricity as of little account only betrays his own ignorance of the unsolved problems and limitless field which confront the worker in the so-called little things of the electrical art.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. ARTHUR E. BOARDMAN, writing hastily from Columbus, Ga., under date of the 4th inst., pays this beautiful tribute to the late Captain William Henry White; and no man from a long series of years of unbroken friendship is better qualified to speak on the gifted one whose debt to nature has been paid:

Dear JOURNAL: By telegraph came to me this morning the unutterably sad intelligence that William Henry White, that chief among gas engineers and prince among men, has passed away. To every member of the gas fraternity throughout the land the news will come as a personal bereavement; but to his family, and to you and me and to the numerous friends who were in frequent intercourse with him, our

grief is inexpressible and his loss will be by us most keenly felt. Of all men with whom I came in contact he was the one of whom it could most truthfully be said, "None knew him but to love him, none named him but to praise." Gifted by nature and acquirements to lead in his chosen profession, his genial spirit often sacrified solid rewards for brilliant engineering achievements to the furthering among his associates of that social enjoyment and intercourse for which he was preeminently gifted. Notwithstanding this, he was greatly esteemed by his associates, and the successive honors which they showered upon him, the highest in their gift, attest the heartfelt appreciation in which he was held as an engineer of marked ability. Generous to a fault, if generosity can be a fault, his sympathy and his purse were never closed to any worthy but unfortunate fellow-being. Tender as a woman toward those in affliction, he was a firm and relentless foe to all forms of deceit and dishonesty. Remarkably fluent in speech, his powers were employed in cheering and encouraging his auditors rather than in invective and reproach. Brilliant in mind and distinguished in bearing, he was the center of attraction in whatever circle he chose to appear; but, at the same time, the humblest stoker or worker in the pipe trench found in him a ready listener and a quick response to appeal for succor or for justice. In short "His was a presence and a form indeed, where every god had set his seal to give the world assurance of a man."

---

A CORRESPONDENT in Richmond, Ind., writing under date of June 28, forwards the following synopsis of the operations of the municipal electric lighting plant at Richmond for something like a twelvemonth: "The second annual report of the municipal electric light commission has been made public. On the face of the report the plant earned $6,901.76, although the report says it does not include any allowance for interest on bonds or depreciation. When the municipal light plant begins to make money ordinary people will be the first to proclaim the fact in large type, but some do not intend to be of that number, who deceive themselves in order to try to deceive someone else. The man who, in an endeavor to keep up public appearances, runs himself hopelessly in debt and then tries to fool himself about it, is not going to make much of a success. The city authorities who insist the municipal plant is making money are fooling themselves most of all, and when the time comes, as it is bound to come, that the truth is brought home to the people, these authorities will reap the reputation of being ignorant or deceitful. The report of the commission stands for itself. There is nothing concealed in it. On the face of it the plant did not make any money, for while the items included in the report show an excess of receipts over expenses of $6,901.76, one of these receipts was a loan of $7,500 from the city, so that the plant's income was not enough to pay for its operating expenses. The loan should not be charged up as an asset; it should be charged up as a liability. It is plain bookkeeping to the average man that in figuring up what he actually earns he does not take into account what he borrows, for that is a debt and must be paid back. But when one goes back of the report and analyzes the situation with the municipal light plant the real truth is startling. As the report says, it makes no allowance for interest on bonds. This is 4 per cent. on $144,000, which amounts to $5,760, and was paid out of the general fund of the city. It makes no allowance for depreciation which, according to all authorities, is 10 per cent. a year on electrical plants. The value of the plant now, according to the commission, is $186,480.97. Of course, this includes the building and other property not to be included in the 10 per cent. depreciation. A deduction of $36,000 for this would be liberal, leaving $150,000 on which to charge 10 per cent. a year for depreciation, making a yearly expense of $15,000. In the usual municipal light plant's report this depreciation appears under the head of 'equipment' or 'new construction,' but it is new machinery put in to keep up the efficiency of the plant and is known as depreciation. The report shows no allowance for the salaries of the commission and its secretary, which amount to $850 a year.

"The commission has borrowed, all told, since its existence, $25,400 from the city. While it pays no interest on this, the city in turn has to borrow money to take its place and pays 5 per cent. interest, so in the end it comes out of the taxpayer's pocket and should be charged against the plant. The interest would amount to $1,270. In addition to these loans and paying interest for the plant the city also paid the plant something like $8,000 for light. By including these items one can begin to get at some fair conclusion as to what the light plant cost us, the taxpayers, because money paid out by the city for maintenance of the plant must be counted, even if it does not appear in the commissioners' report. It is paid out and it has to be raised by taxes. The figures are about like the following:

| | |
|---|---|
| Depreciation on $150,000 | $15,000 |
| Interest on $144,000 | 5,760 |
| Interest on $24,500 | 1,270 |
| Salaries of commission | 850 |
| Paid out for lighting | 8,000 |
| Total | $30,880 |

"That is, there was an expense to the city, on account of the light plant, of $30,880, which does not appear in the commissioners' report. By subtracting this from the profit shown in the commissioners' report, $6,901.76, we will have $23,987.24 less than nothing, which amount represents the profits of the light plant."

---

AT a recent meeting of the City Council of Boone, Ia., it was determined to award to the Boone Gas Company a contract under which the Company is to maintain on street lighting account for the term of 5 years 60 Welsbach lamps on the basis of an annual payment of $22.50 per lamp. The balance of the street lighting for the next 5 years will be carried by the Boone Electric Light and Street Railway Company, which is to maintain 80 arc lamps, 1,200-candle power, at the rate of $62.50 per annum each. The Philadelphia schedule covers the hours of lighting in each instance.

---

MR. JAMES FERRIER, who has served the Columbus (Ga.) Gas Light Company as General Superintendent since 1892, has accepted the position of President and General Manager of the Rome (Ga.) gas works. His successor at Columbus is Mr. MacDugald Dexter, who has been with the Columbus Company since 1897.

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THE proprietors of the Consumers Gas Company, of Toronto, Can., have arranged for the construction of a new holder on their property at Front and Trinity streets. Its rated capacity is 3,000,000 cubic feet.

---

MESSRS. C. S. FAIRCHILD and A. M. HYATT, two of the three trustees holding the stock trust shares of the Springfield (Mass.) Gas Light Company, deposited under agreement and declaration of trust, have resigned. Their successors are Messrs. C. H. Tenney and Samuel A. York.

---

THE proprietors of the Waterloo and Cedar Falls (Ia.) Gas and Electric Company report a marked increase in business for the first six months of the current year as against the corresponding half of 1903. In May 80 gas ranges were placed, and in June 86 were put in service.

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THE annual meeting of the Fulton County (N. Y.) Gas and Electric Company will be held in Johnstown, N. Y., at 11 A. M. to-morrow.

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THE proprietors of the Waltham (Mass.) Gas Light Company have petitioned the Board of Gas and Electric Light Commissioners for the right to issue $150,000 additional capital stock.

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IT is likely that the Public Service Corporation of New Jersey will extend its main system from Plainfield to Fanwood and Westfield.

---

MR. CHARLES M. PRINTZ, of Zanesville, O., may accept a position in the engineering service of the Tokyo (Japan) Gas Company. In any event such a position has been offered to nim.

---

THE properties of the Nantucket (Mass.) Gas and Electric Company have been placed in the hands of a receiver.

---

MR. JOSEPH J. STOUT, at one time Vice-President of the New York Mutual Gas Light Company, and if we remember right one of its Directors at the time of his death, died at his country home, Bernardsville, N. J., June 28th. He was in his 59th year, having been born in New York City, Dec. 27, 1846.

---

MR. A. B. ESTES has resigned from the service of the Houston (Tex.) Gas Company.

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THE authorities of Elgin, Ills., have stipulated that before the projectors of the National Gas Company (a proposed opposition gas concern) may be granted a working ordinance they will have to agree to pay into the city treasury the sum of 10 per cent. of the gross receipts.

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THE Sterling (Ills.) Gas and Electric Light Company is offering for sale $50,000 five per cent. gold bonds, payable June 1, 1927. Interest is payable June and December.

---

THE Kings County Gas and Illuminating Company, of Brooklyn, N. Y., has been merged with the Kings County Light and Power Company.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

MONDAY, JULY 11, 1904.

## The Market for Gas Securities.

Although there was not much business done on the Exchange, respecting numbers of shares in Consolidated sold during the week, the trading was mainly made at advancing figures. The high price was reached to-day (Friday), the closing quotations being 195 to 195½. The rise is attributable to the growing belief that the courts are likely to grant the Company the relief which low priced legislators, pettifogging politicians and rabies named "journalists" would deny—unless the "proper price," one way or another, were paid. City gas bonds are in brisk demand.

Brooklyn Union is slow as to trading, and the nominal quotations are 213 to 220. Consolidated, of Baltimore, is 73 to 75, and the Laclede preferred securities are 80 to 100, which indicates the difference in thought between would-be holders and owners. Peoples, of Chicago, is again close to the par mark, 98⅛ being bid for it. Cincinnati Gas and Electric is 101¼ bid. The Company is issuing about $1,800,000 of treasury stock, to holders of record, June 15, at par.

## Gas Stocks.

**Quotations by George W. Close, Broker and Dealer in Gas Stocks.**

16 WALL STREET, NEW YORK CITY.

JULY 11.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

| *N. Y. City Companies.* | *Capital.* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated | $78,177,000 | 100 | 195 | 195½ |
| Central Union, Bonds, 5's | 3,000,000 | 1,000 | 106½ | 106⅝ |
| Equitable Bonds, 6's | 1,000,000 | 1,000 | 105 | .. |
| " 1st Con. 5's | 2,300,000 | 1,000 | 118 | 120 |
| Metropolitan | 656,000 | .. | 108 | 112 |
| Mutual | 3,500,000 | 100 | 270 | 300 |
| Municipal Bonds | 750,000 | .. | .. | .. |
| New Amsterdam Gas Co.. | | | | |
| Bonds, 5's | 11,000,000 | 1,000 | 105¼ | 106 |
| New York & Richmond Gas Co. (Staten Island) | 1,500,000 | 100 | 34 | .. |
| 1st Mtg. Gold Bds. 5 p. ct. | 1,000,000 | .. | .. | .. |
| Northern Union, Bonds, 5's | 1,250,000 | 1,000 | 102½ | 105½ |
| New York and East River.. | | | | |
| Bonds 1st 5's | 3,500,000 | 1,000 | 109½ | 111 |
| " 1st Con. 5's | 1,500,000 | .. | 106 | 108 |
| Standard | 5,000,000 | 100 | 125 | 13 |
| Preferred | 5,000,000 | 100 | 145 | 155 |
| Bonds, 1st Mortgage, 5's | 1,500,000 | 1,000 | 116 | 117 |
| Yonkers | 299,250 | 500 | 130 | .. |
| *Out-of-Town Companies.* | | | | |
| Brooklyn Union | 15,000,000 | 100 | 213 | 220 |
| " " Bonds (5's) | 15 000,000 | 1,000 | 113 | 115 |
| Bay State | 50,000,000 | 50 | ⅜ | 3/16 |
| " Income Bonds | 2,000,000 | 1,000 | .. | 75 |
| Binghamton Gas Works | 450,000 | 100 | 28 | 30 |
| " 1st Mtg. 5's | 509,000 | 1,000 | 93 | 96 |
| Boston United Gas Co.— | | | | |
| 1st Series S. F. Trust | 7,000,000 | 1,000 | 82 | 85 |
| 2d " " " | 3,000,000 | 1,000 | 47½ | 50 |
| Buffalo City Gas Co. | 5,500,000 | 100 | 3¾ | 4 |
| " " Bonds, 5's | 5,250,000 | 1,000 | 12¾ | .. |
| Capital, Sacramento | 500,000 | 50 | .. | 35 |
| Bonds (6's) | 151,000 | 1,000 | .. | .. |
| Chicago Gas Co. Guaranteed Gold Bonds | 7,650,000 | 1,000 | 104 | 104¼ |
| Cincinnati Gas and Electric Co | 29,500,000 | 100 | 101¾ | 102 |
| Columbus (O.) Gas Co., 1st Mortgage Bonds | 1,500,000 | 1,000 | 101 | 101½ |
| Columbus (O.) Gas Lt. & Heating Co | 1,682,730 | 100 | 88¾ | 89¼ |
| Preferred | 3,026,500 | 100 | 107½ | 109 |
| Consumers, Toronto | 1,700,000 | 50 | 218 | 225 |
| Consolidated, Baltimore | 11,000,000 | 100 | . | 75 |
| Mortgage, 6's | 3,500,000 | .. | .. | 118 |
| Chesapeake, 1st 6's | 1,000,000 | .. | .. | .. |
| Equitable, 1st 6's | 910,000 | .. | .. | .. |
| Consolidated, 1st 5's | 1,400 000 | .. | .. | 113 |
| Consolidated Gas Co. of N.J. | 1,000,000 | 100 | 15 | 17 |
| " Con. Mtg. 5's | 980,000 | 1,000 | 86 | 90 |
| Consolidated G. & E. Co.'s. Little Falls, N.Y. | 90,000 | 100 | .. | 100 |
| Bonds | 75,000 | .. | .. | 100 |
| Detroit City Gas Co. | 4,825,500 | 50 | .. | 50 |
| " Prior Lien 5's | 5,602,000 | 1,000 | 99½ | 100 |
| Detroit Gas Co., 5's | 351,000 | 1,000 | 75 | 75¼ |
| " Inc. 5's | 16,000 | 100 | 98½ | 100 |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | .. | 101 |
| Essex and Hudson Gas Co. | 6,500,000 | .. | 39 | 40 |
| Fort Wayne | 2,000,000 | .. | .. | .. |
| " Bonds | 2,000,000 | .. | 35 | .. |
| Grand Rapids Gas Lt. Co. 1st Mtg. 5's | 1,225,000 | 1,000 | 104½ | 105 |
| Hartford | 750,000 | 25 | 190 | 200 |
| Hudson County Gas Co., of New Jersey | 10,500,000 | .. | 67 | 68 |
| " Bonds, 5's | 10,500,000 | .. | 103½ | 104½ |
| Indianapolis | 2,000,000 | .. | 60 | 70 |
| " Bonds, 6's | 2,650,000 | .. | 103½ | 103½ |
| Jackson Gas Co. | 250,000 | 50 | 73 | 75 |
| " 1st Mtg. 5's | 290,000 | 1,000 | 101 | 102½ |
| Kansas City Gas Light Co., of Missouri | 5,000,000 | 100 | .. | 36 |
| Bonds, 1st 5's | 3,822,000 | 1,000 | 102 | 104 |
| Laclede, St. Louis | 10,000,000 | 100 | .. | .. |
| Preferred | 2,500,000 | 100 | 80 | 100 |
| Bonds | 10,000,000 | 1,000 | 109½ | 110 |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | .. | 60 |
| Bonds | 1,000,000 | 1,000 | 60 | 65 |
| Louisville | 2,570,000 | 50 | 136 | 140 |
| Madison Gas & Elec. Co. " 1st Mtg. 6's | 350,000 | 1,000 | 107½ | 108¼ |
| " 6 per cent. scrip, due 1910 | 100,000 | 25 | 85 | 87 |
| Montreal, Canada | 2,000,000 | 100 | 218 | 218¾ |
| Nashville Gas Lt. Co. | 1,000,000 | 100 | 110 | .. |
| Newark, N. J., Con. Gas Co. | 6,000,000 | .. | 56 | 58 |
| Bonds, 6's | 4,600,000 | .. | 105 | 105¾ |
| New Haven | 1,000,000 | 25 | 64 | 70 |
| Peoples G. L. & Coke Co., of Chicago | 25,000,000 | 100 | 98¾ | 99 |
| Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage | 20,100,000 | 1,000 | .. | .. |
| 2d " | 2,500,000 | 1,000 | 104 | . |
| Rochester Gas & Elec. Co.. | 2,150,000 | 50 | 88 | .. |
| Preferred | 2,150,000 | 50 | 118 | .. |
| Consolidated 5's | 2,000,000 | .. | 87½ | 90 |
| San Francisco, Cal. | 15,800,000 | 100 | 58¼ | 58¾ |
| St. Joseph Gas Co. " 1st Mtg. 5's | 751,000 | 1,000 | 92 | 96½ |
| St. Paul Gas Light Co. | 1,500,000 | 100 | 45 | 47 |
| 1st Mortgage 6's | 650,000 | 1,000 | 113 | 116 |
| Extension, 6's | 600,000 | 1,000 | 112½ | 115 |
| General Mortgage, 5's | 2,465,000 | 1,000 | 92 | 93 |
| Syracuse, N. Y. | 1,975,000 | 100 | 46 | 48 |
| Bonds | 2,047,000 | 1,000 | 94 | 96 |
| Washington, D. C | 2,600,000 | 20 | 286¼ | 288¾ |
| First mortgage 6's | 600,000 | .. | .. | .. |
| Western, Milwaukee | 4,000,000 | . | .. | .. |
| Wilmington, Del. | 600.000 | 50 | 230 | .. |

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## DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., June 8, 1904.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1904, to stockholders of record at the close of business, June 30, 1904. Checks will be mailed.

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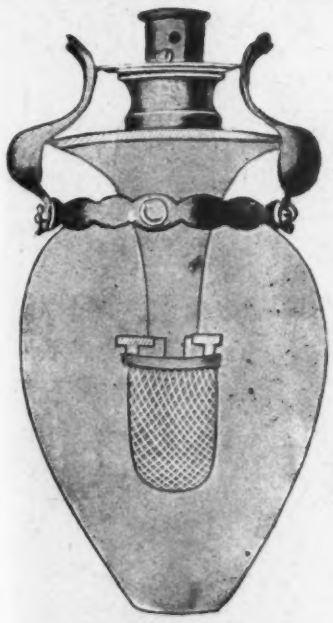

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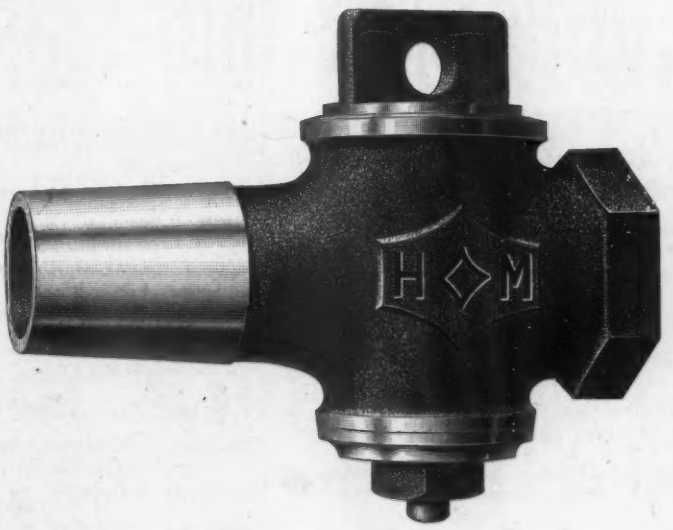


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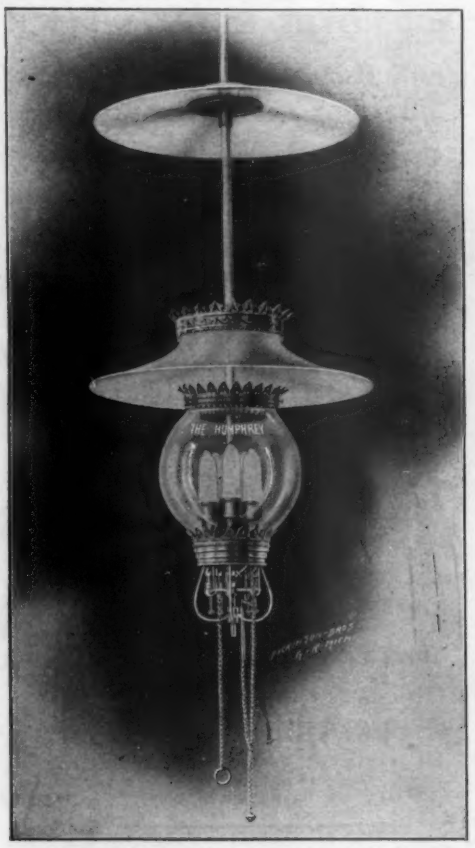

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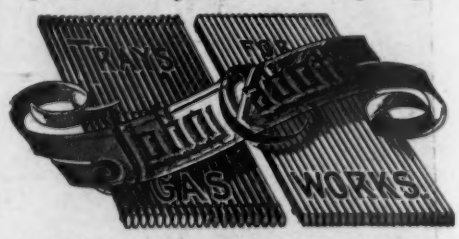


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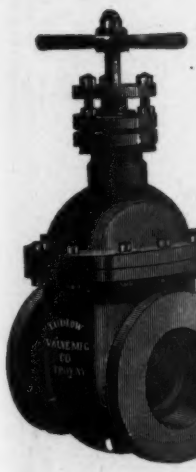

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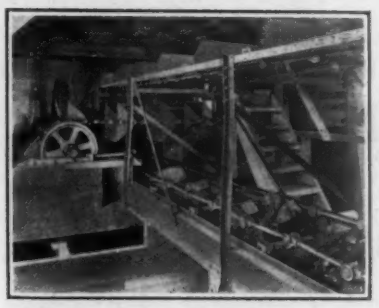

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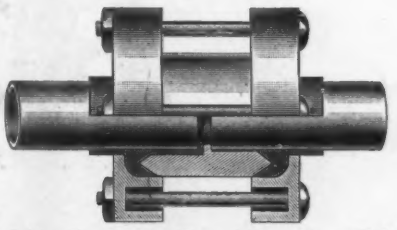
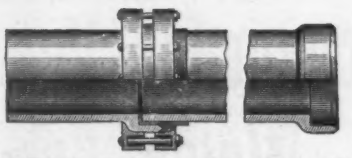
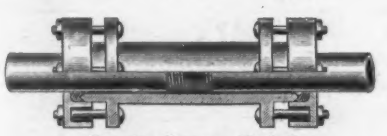


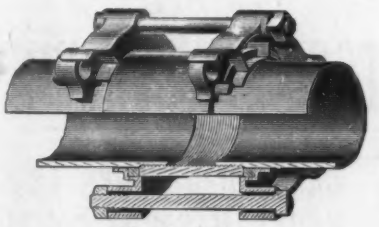
Insulating Coupling for Wrought Iron Pipe. Style 5.



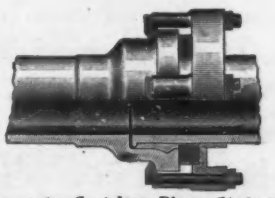
Insulating Coupling for Dresser Bell and Spigot Cast Iron Pipe. Style 6.



Regular Sleeve. Style 2.



Clamp. Style 4.



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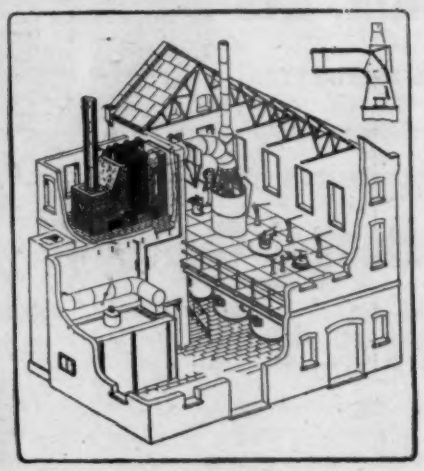

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Where d = diameter of pipe in inches,
$p_1$ = absolute initial pressure in pounds per square inch,
$p_2$ = absolute terminal pressure in pounds per square inch,
L = length of pipe in miles,
w = specific gravity of the fluid when air = 1.

**To Find the Discharge from a Pipe and the Required Size of Pipe.**

(1.) Set the specific gravity of the fluid opposite the length of pipe;
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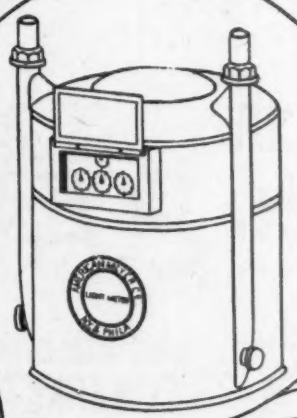
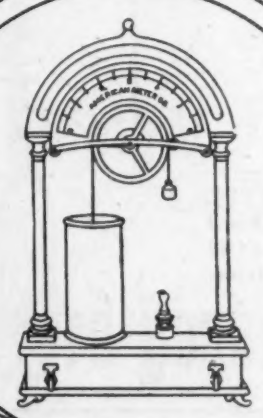
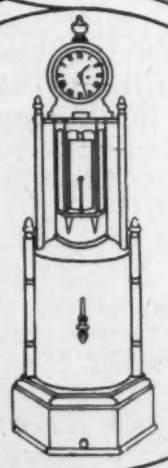


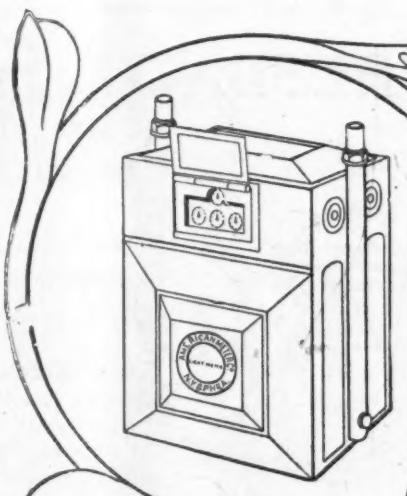


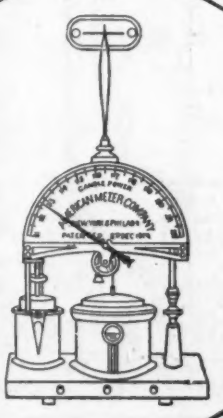


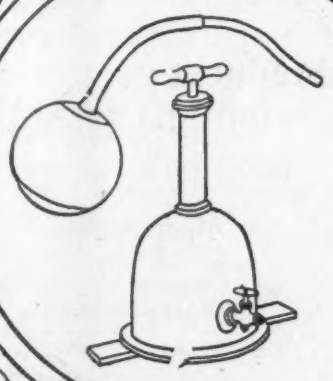
## PUBLIC LIGHTING TABLE.

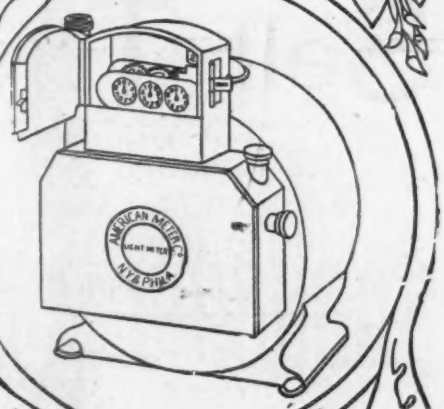
### JULY, 1904.

| Day of Week. | Date. | Table No. 1. FOLLOWING THE MOON. Light. | Extinguish | Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light. | Extinguish. |
|---|---|---|---|---|---|
| | | | | P.M. | A.M. |
| Fri. | 1 | 8.00 PM | 10.50 PM | 7.30 | 3.15 |
| Sat. | 2 | 8.00 | 11.20 | 7.30 | 3.15 |
| Sun. | 3 | 8.00 | 11.50 | 7.30 | 3.15 |
| Mon. | 4 | 8.00 | 12.20 AM | 7.30 | 3.15 |
| Tue. | 5 | 8.00 LQ | 12.50 | 7.30 | 3.15 |
| Wed. | 6 | 8.00 | 1.20 | 7.30 | 3.15 |
| Thu. | 7 | 8.00 | 2.00 | 7.30 | 3.15 |
| Fri. | 8 | 8.00 | 2.40 | 7.30 | 3.15 |
| Sat. | 9 | 8.00 | 3.40 | 7.30 | 3.15 |
| Sun. | 10 | 8.00 | 3.40 | 7.30 | 3.15 |
| Mon. | 11 | 8.00 | 3.40 | 7.30 | 3.15 |
| Tue. | 12 | 8.00 NM | 3.40 | 7.30 | 3.15 |
| Wed. | 13 | 8.00 | 3.40 | 7.30 | 3.15 |
| Thu. | 14 | 8.00 | 3.40 | 7.30 | 3.15 |
| Fri. | 15 | 8.00 | 3.40 | 7.30 | 3.15 |
| Sat. | 16 | 8.00 | 3.40 | 7.20 | 3.15 |
| Sun | 17 | 9.30 | 3.50 | 7.20 | 3.15 |
| Mon. | 18 | 10.00 | 3.50 | 7.20 | 3.15 |
| Tue. | 19 | 10.40 FQ | 3.50 | 7.20 | 3.15 |
| Wed. | 20 | 11.20 | 3.50 | 7.20 | 3.15 |
| Thu. | 21 | 12.00 | 3.50 | 7.20 | 3.15 |
| Fri. | 22 | 12.40 AM | 3.50 | 7.20 | 3.15 |
| Sat. | 23 | 1.30 | 3.50 | 7.20 | 3.15 |
| Sun. | 24 | 2.20 | 3.50 | 7.20 | 3.15 |
| Mon. | 25 | No L. | No L. | 7.20 | 3.15 |
| Tue. | 26 | No L. FM | No L. | 7.20 | 3.15 |
| Wed. | 27 | No L. | No L. | 7.20 | 3.15 |
| Thu. | 28 | 7.50 PM | 8.50 PM | 7.20 | 3.15 |
| Fri. | 29 | 7.50 | 9.30 | 7.20 | 3.15 |
| Sat. | 30 | 7.50 | 10.00 | 7.10 | 3.30 |
| Sun. | 31 | 7.40 | 10.30 | 7.10 | 3.30 |









## TOTAL HOURS LIGHTING DURING 1904.

| By Table No. 1. | Hrs. Min. | By Table No. 2. | Hrs. Min. |
|---|---|---|---|
| January | 225.00 | January | 423.20 |
| February | 205.40 | February | 367.40 |
| March | 187.40 | March | 355.35 |
| April | 169.50 | April | 298.50 |
| May | 152.30 | May | 264.50 |
| June | 137.20 | June | 234.25 |
| July | 138.50 | July | 243.45 |
| August | 151.00 | August | 280.25 |
| September | 164.40 | September | 321.15 |
| October | 191.30 | October | 374.30 |
| November | 210.30 | November | 401.40 |
| December | 237.10 | December | 433.45 |
| Total, yr. | 2171.40 | Total, yr. | 4000.00 |

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

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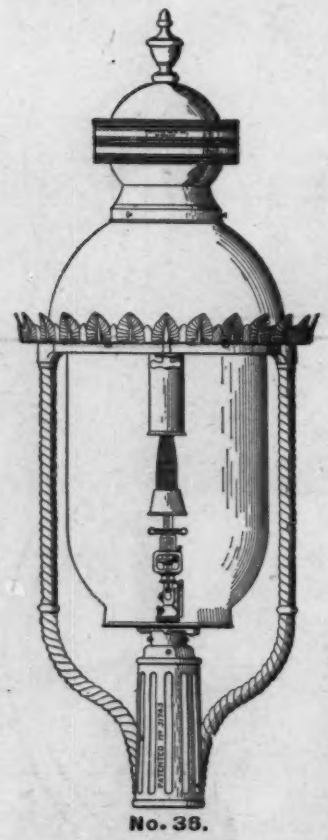

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The imitation stuff is bad for the customer---which is bad for you.

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| Winsted, Conn. | Pueblo, Col. | Lawrence, Mass. |
| Canon City, Col. | Charlotte, N. C. | Council Bluffs, Ia. |
| Schenectady, N. Y. | Fall River, Mass. | Chattanooga, Tenn. |
| Hagerstown, Md. | Duluth, Minn. | Tuckerton, N. J. |
| Malden, Mass. | New York (Mutual Co.) | Springfield, O. |
| Bridgeport, Conn. | Waltham, Mass. | Easton, Pa. (2d contract). |
| Albert Lea, Minn. | Dover, Del. | Mobile, Ala. |
| Brooklyn, N. Y. | York, Pa. | Conshohocken, Pa. |
| Kansas City, Kas. | Minneapolis, Minn. | Mason City, Ia. |
| Hempstead, N. Y. | Allentown, Pa. | |

TOTAL SETS FOR 1903, . . . . . 62
TOTAL DAILY CAPACITY, . . . . . 62,950,000 cubic feet.
TOTAL SETS TO DATE, . . . . . 508
TOTAL DAILY CAPACITY, . . . . . 362,780,000 cubic feet.

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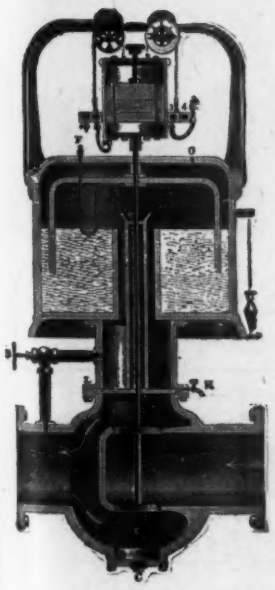

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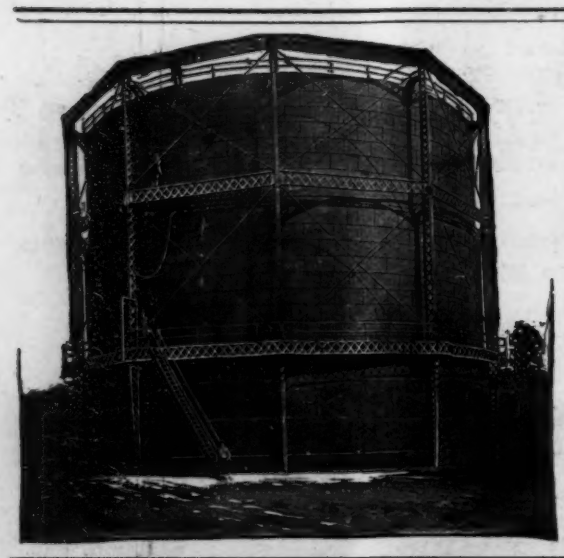

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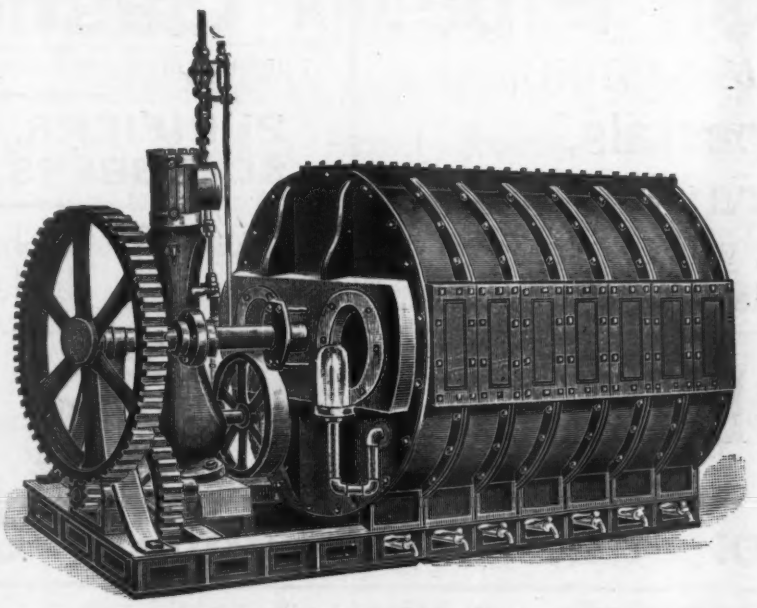

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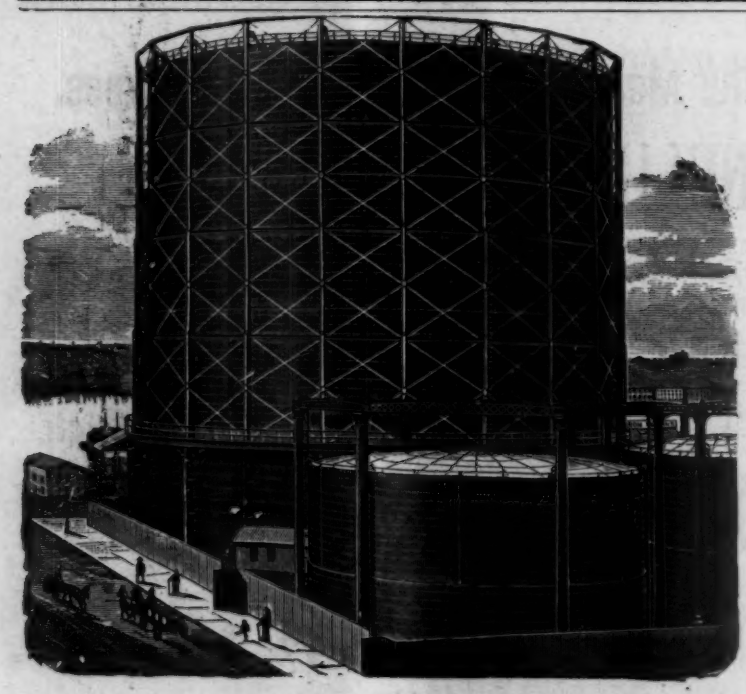

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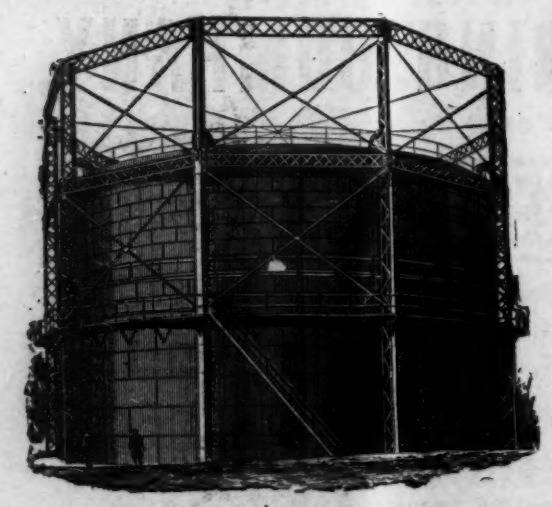

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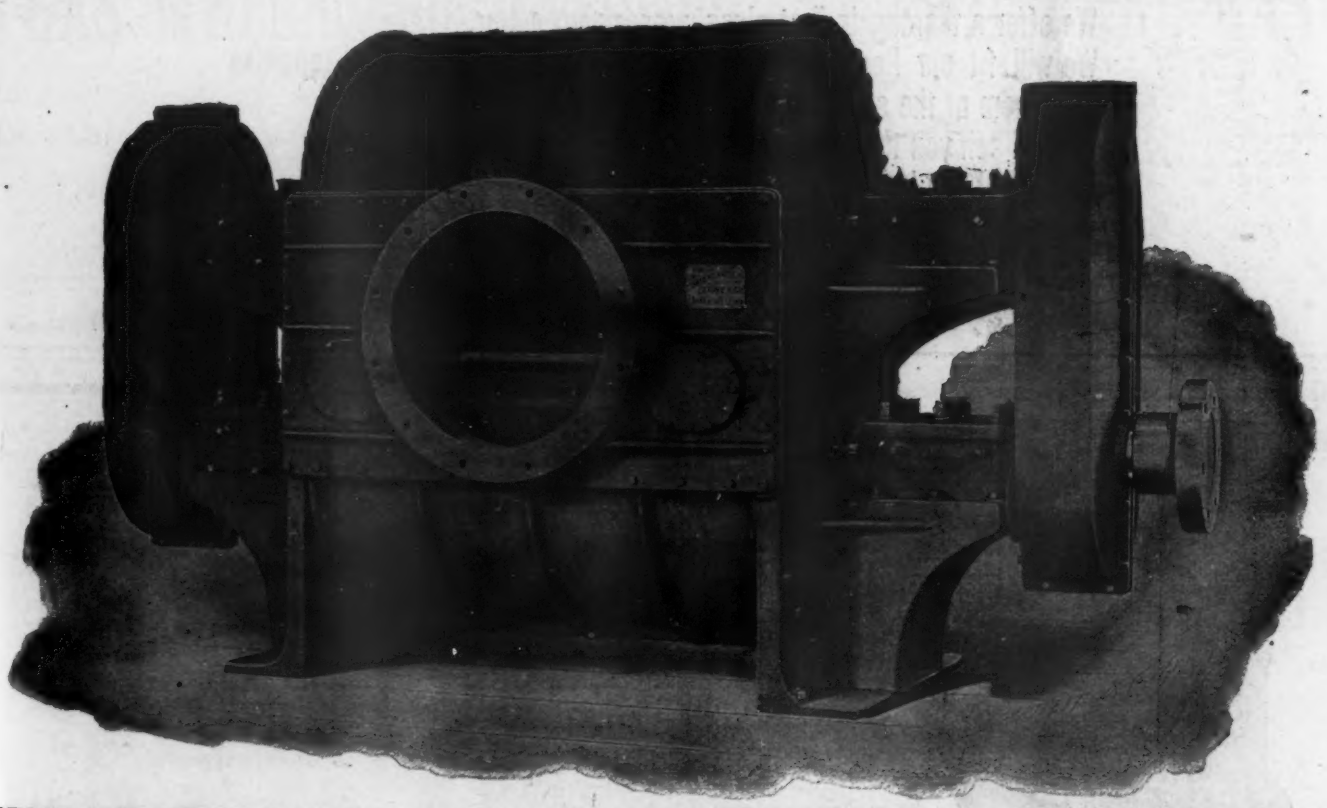

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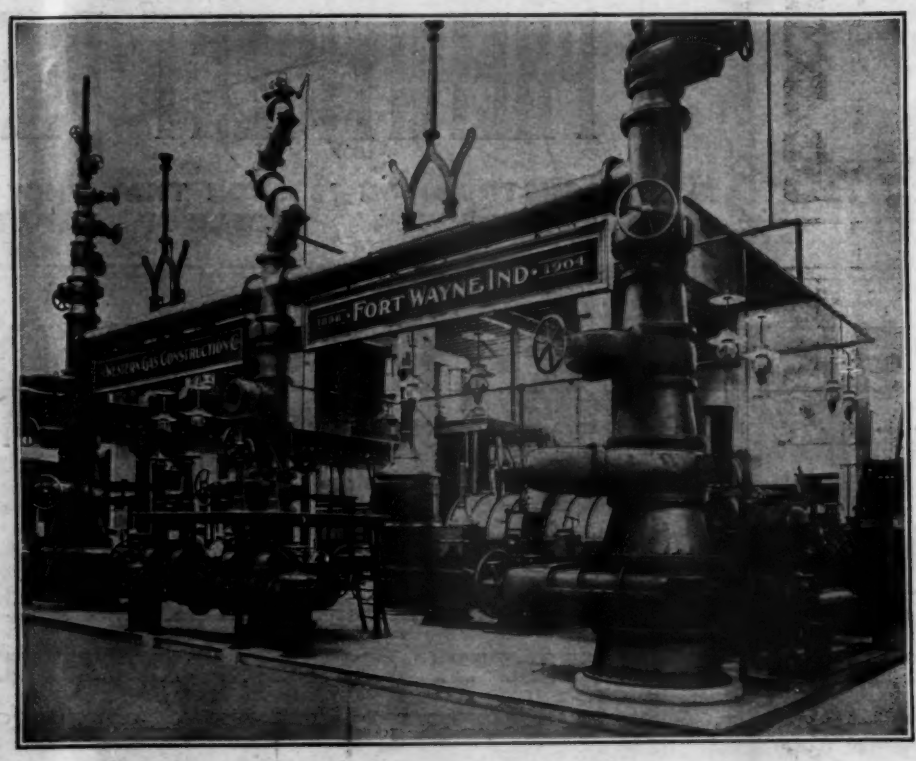


Section 15A.

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